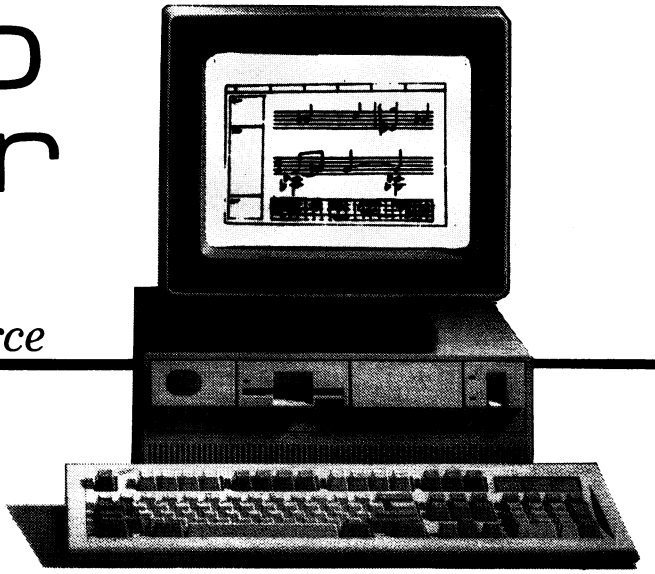
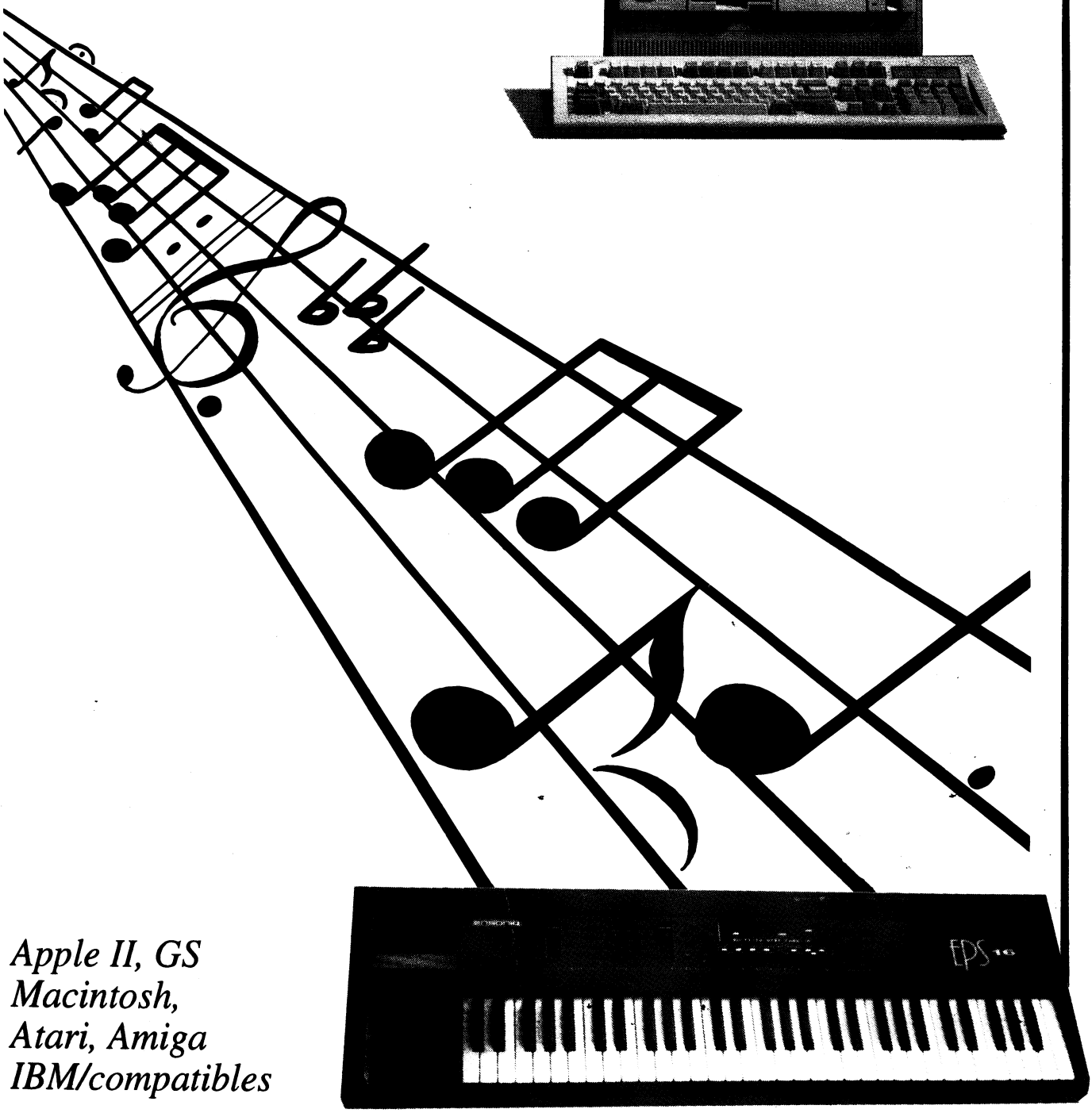
a guide to computer music

An Electronic Music Resource





Apple II, GS
Macintosh,
Atari, Amiga
IBM/compatibles

Second and Revised Edition

A Guide To Computer Music

An Electronic Music Resource

SECOND AND REVISED EDITION

By

Donald P. Kozak

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Dedicated to Marilynn & Stephanie
For All Your Help and Love

Preface

Since the advent of MIDI in 1983, MIDI instrument manufacturers have inundated the market with a multi-billion dollar generation of compatible electronic devices. Through the evolution of synthesis, new tools have been discovered to enhance our creativity and productivity levels. Professional musicians were first, then music educators and computer amateurs and now consumers are intrigued by these musical marvels. Today, most name brand personal computers can be linked to the world of MIDI, and even stand-alone musical computer systems, equipped with sound chips and sound boards, can generate crisp clear tone colors. You have heard electronic sounds for nearly three decades: in popular theme songs, pop music, advertising, motion picture soundtracks, and even jazz, classical, and new age styles of music!

Electronically influenced music is the synthesis of art and technology. Making music electronically and utilizing the technological advances encompasses computers, software, MIDI, electronic keyboards, and other electronic devices. A lifetime of musical experiences can become accompanied in an ensemble of digital processors to achieve unexpected effects: innovation, new sound, emotion, conception, assortment, vision, color, warmth and drama.

The publisher and authors of this reference guide will introduce you to the exciting world of musical electronics, MIDI, computers, software, instruments, and synthesis, for Apple computers, IBM/compatibles, Amiga, and Atari as well as provide important reference materials to help you start this fascinating journey.

Goals & Objectives Of This Guide

The fields of music and electronics have been combined to form the basis for a new phenomenon--*musical electronics.* As a tool, computer hardware, software, and MIDI instrument/devices can greatly assist and enrich our musical and creative abilities. The primary goal of this guide is to introduce the basics of musical electronics so that you may benefit from this new technology and to:

• Enhance and encourage the creative process and the understanding of basic computer-MIDI systems and other musical electronic devices.

• Provide information and insight into the wide variety of music software, hardware, and multimedia products for innovative and educational use for IBM/compatibles, Macintosh, Amiga, Atari, Apple IIgs, IIe, II+, and Commodore 64/128.

• Provide information and insight into music sequencing software and notation software for most computers and additional sequencing and notation information for the Apple IIGS.

• Provide user set-up information for organizing a computer music system for sequencing, composition, editing, playback, and printing of sheet music for most desktop computers.

• Provide basic guidelines and tips for the development of a computer-based MIDI system for music curriculum, integration of software for composition, editing, playback, and printing of sheet music for most desktop computers.

• Provide reading and purchasing resources for continued development and budget/cost considerations for most computers

• Provide MIDI illustrations and configurations of MIDI computer systems.

• Explain and provide an up-to-date list of common computer and electronic music terms for user support.

Chapter One: Getting Started

Musical Electronics 101
MIDI Basics: Understanding Channels, Tracks, and Sequencers
Organizing A MIDI System
45 Helpful Guidelines & Buying Tips
MIDI Starter Solutions
Computer and MIDI Planning Forms

MUSICAL ELECTRONICS 101

A Technology of Creativity and Productivity

A Little Electronic Background

The use of electronics for musical expression can be traced back to the movement of pop and rock styles of music during the 1960's and 1970's. As musicians searched for originality in performance and recording sounds, it was realized that through "synthesis," unique tones could be created/generated and modified for their musical persona. Electrical impulses can reproduce sound in a similar pattern as the mechanical vibrations required by actual instruments. The ability to synthesize sound set the stage for a new musical revolution: the use of electronic instruments and contemporary tone colors (abstract and immitative synthesis) to artistically redefined the boundaries of creativity and productivity.

Through ingenous electronic engineering developers like Robet Moog, ARP, EMS, and other well-known manufacturers, synthesis evolved. Twenty five years of technological pioneering brought the musical electronics industry to today's level of sophistication. Like all new technologies, there were problems, and early synthesis was no exception. In order to generate a synthesized sound, a complex organization of patched cards (cables) had to be manually wired to each device—in and out of multiple modulator synthesizers, envelope generators, and filters, each extremely tempermental and valued at thousands of dollars. When a different sound was needed, it was essential to repatch and tune the entire configuration. In time, as the field advanced, microelectronic technology yielded programmable synthesizers which allowed musicians push button control over the storage of specific sounds. Integrated circuits, custom music chips, and microprocessors replaced the cumbersome individual modules eliminating much of the time consuming patching.

But problems with compatibility and synchronization remained and escalated with the introduction of new gernerations of musical electronics. Technical musicians would experience hangups when connecting differently manufactured devices. The connection of electronic instruments was desirable in an effort to create unique polyphonic and monophonic sounds. Consequenly, musicians had to simultaneously play and manually control multiple keyboards and effect devices. Slowly, a series of electronic products and quick "cures" emerged such as synch-to-tape equipment which greatly helped musicians overcome technical recording and dubbing difficulties.

Throughout the 1970's, electronic instrument manufacturers such as Roland, Korg, Oberheim, and EMU Systems develped and supplied the music industry with a generation of feature-rich keyboards and sound effects gear. Within ten years, the field of musical electronics revolutionized the music and recording industries. Musicians could expect changes in product lines by the month that boasted of newer conveniences, richer sound patches as well as deluxe models of electronic instruments. A full spectrum of creative tools enhanced their talents and yet they were constrained by manufactuers' standards.

MIDI: The Key To Musical Electronics

Musical Instrument Digital Interface, or MIDI was estabished in a cooperative effort, in 1983, by American and Japanese industries. MIDI became the communication standard to connect differently manufactured electronic devices. MIDI offers far more possibilities than was orginally realized. This international MIDI standard, a male/female five-pin DIN port/cable, is a serial protocol and by

simply plugging in one MIDI-equipped device to another the compatibility problem was ended. The well-accepted MIDI standard can send and receive a variety of musical and technical data. Through the MIDI port/cables/interface a variety of MIDI devices (synthesizers, samplers, drum machines, and other controllers) can transmit information about performance. Through the MIDI communications link, electronic signals can be sent and received by each device that has been connected. The 16 channels within the MIDI interface standard transmits digital information such as: note on/off, exact keys and notes being played on a MIDI-equipped keyboard, when they are played and even at what degree of touch-release sensitivity, velocity sensing, and sound patch change within your MIDI device, as well as what control levers and pedals are used to regulate the pitch, timbre, vibrato, and volume. With MIDI compatibility and communication, a group of MIDI instruments can work in harmony just as if you were the conductor orchestrating all the members.

Since MIDI devices and personal computers both control data—they have become partners. A computer-controlled MIDI system can take on the exciting dimension of controlling multiple instruments and devices simultaneously, each playing it's own predesigned part or parts with single or multiple sounds. Powerful MIDI software has been developed to coordinate your MIDI device/s, computer, and interface. To connect your computer to a MIDI instrument, a MIDI interface is used. The MIDI interface is custom-made, internal or external, user-installed hardware that simply snaps into an expansion slot of your computer; and if this is not possible, a stand-alone MIDI interface device (box) can be connected to your computer's serial port by a cable.

The period from 1968 to 1988 represents twenty years of great achievements in musical electronics; the hardware developments could look something like this:
Minimoog—ARP 2600—TEAC 3340—E-mu Poly Keyboards—Roland MC-4—Music IC's, Oberheim—Prophet-5—Korg Polysix—SID Chip—Fairlight CMI—N.E.D. Synclavier—LinnDrum—Simmons Drums—MIDI—E-mu Emulator II—Ensoniq Mirage—Expressive Keyboards—Lexicon PCM70—Yamaha DX—FM and LA Synthesis (Electronic Musician, July, 1988). Future developments in this area would appear to be almost unlimited. . .

Industry Leaders

Today, many new developer/manufactures of musical electronics have joined the MIDI-related industry with their product lines and custom software support. Some of the leading organizations include: Akai, Alesis, Apple, Atari, Coda, Casio, Commodore, Dr. T, Electronic Arts, Electrovoice, E-mu Systems, Ensoniq, Fostex, Great Wave, IBM/clones, JBL, Kawai, Korg, Kurzweil, Lexicon, Mark of the Unicorn, Microillusions, MusicQuest, Oberheim, Opcode, Passport, Pyware/Pygraphics, Roland, SoundCraft, StudioMaster, Sound Quest, Tascam, Technics, Sonus, SouthWorth, Voyetra, and, Yamaha.

Musical Computers

Just in the last few years, stand-alone musical computers (i.e., Apple IIGS, Next Computers) with sound chips, CD-sound quality hardware, and add-on stereophonic sound boards have become associated with the world of musical electronics. IBM/compatibles and Macintosh computers can also be equipped with add-on synthesis hardware and use software to coordinate and generate sound/music. Usually, the computer generated sound is heard through the computer's internal or external speaker system. In other words, musical computers can generate sound without a MIDI device. Musical computer systems, (i.e., Apple IIGS) are primarily reserved for education, research, and the home, while MIDI equipment remains the professional and serious users' choice. The sound quality of computer-generated music is "electronic sounding;" whereas, the sound emanating from high-end MIDI devices is more "real sounding." But, a Macintosh II series computer used with a Proteus NuBus card or an IBM with an internal SoundBlaster or Audio Spectrum board installed are very impressive options.

Ending Notes

Electronic music, MIDI, musical electronics, and computer-controlled music are common terms for the electronic sounds or musical rhythms that are generated and controlled by a variety of devices. Musical electronics are devices such as MIDI synthesizers, samplers, drum machines, sound chips, and even stand-alone musical computer systems that have become an economical method for creating the sounds of an entire orchestra in a simple to complex musical composition.

To synthesize sound, a specific sound's waveform is electronically designed and finely tuned. This waveform represents a sound's characteristics and will be electronically generated by the oscillators of a MIDI device or within the computer hardware or add-on sound cards. If an electronic sound is not synthesized, then an electronic sound can be referred to as a "sampled sound" in which a sound has been copied or transferred/stored into the memory of an electronic device or onto disk. These sound files, voice patches and librarians, or preprogrammed sounds can be used over and over again and will sound exactly the same every time. Many musicians also use MIDI samplers as well as MIDI synthesizers, as sound designers—sound tweaking is quite technical but more real sounding and requires a higher level of technical knowledge and sound engineering skills.

Since synthesized sound has been used successfully for more than two decades, more music educators, professional musicians, and amateurs have been attracted by the dazzling sounds. Within the last five years, the advancements in musical technology and software development have progressed so fast that professional musicians and technicians spend countless hours to learn and use the powerful musical devices that are available.

Today, a personal computer, MIDI interface, software for sound editing, sequencing, and composing can be easily connected to these powerful musical electronic MIDI devices. You, too, can start and learn to use these fascinating electronics by organizing a computer-based music system!

MIDI BASICS: UNDERSTANDING CHANNELS, TRACKS & SEQUENCERS

MIDI Channels

When you install a MIDI interface your computer can communicate to your MIDI device. Boot up your sequencing software and you are ready to send and receive MIDI data. The MIDI communication standard has been developed to allow for 16 channels (32 channels can be addressed with a multi-port MIDI interface and supportive sequencing software) of muscial data to be transmitted IN/OUT/THRU your MIDI cables to your MIDI device/s and computer. These assignable MIDI channels will transmit to the user a variety of digital information such as: what notes are being played on your polyphonic/ multitimbral keyboard (note on/off), with what degree of touch-release sensitivity, the velocity sensing, and even sound patch switching within your MIDI device, as well as what control levers and pedals are used to regulate the pitch, timbre, vibrato and volume.

For example, assign channel one to a MIDI instrument that contains a tight brass sound, a second channel to a drum machine with a pre-programmed rhythm, and a third channel assigned to a slave synth or module set for anyone of its many patches or presets playing the melody lead. Remember, multitimbral MIDI devices can be assigned more than one tone color and channel. You could continue to build an entire composition around three MIDI devices assigning each instrument different channels and multi-parts and voices.

MIDI devices are equipped with LCD display screens and push buttons to control various features including sound selection and channel selections, usually 1-16 which will also match the software sequencer channel. The instrument's control features regulate waveforms, values, tone colors, parameters, vibrato, delay, tone mix, pitch, the selected waveform envelope to be altered, and the octave. Your computer, sequencer, and MIDI devices will, conduct the whole operation once you have assigned the parts to an appropriate channel.

Tracks

Sequencer hardware and sequencing software are like digital tape recorders that contain data tracks (4, 8, 12, 16, 24, 32, 64...256 to an unlimited amount) that can direct and store musial data. For starters, the use of tracks on a MIDI sequencer will allow you to organize, create, compose, assign octaves, instruments, and sound patches within the MIDI configuration.

Tracks in a sequencer will be designated to a specific MIDI channel as each numbered track can play and store specific instruments' parts. Multiple tracks can be programmed to the same MIDI channel of the same device or any MIDI device within the design.

Sequencers

Sequencers accumulate, coordinate, and manipulate musical data for each component's parts, much in the same way as a conductor of an orchestra. The sequencer will allow each device to perform as part of an ensemble. Sequencers primarily store data in much the same way as a multi-track recorder with powerful editing and storing ability. There are three forms of sequencers: a computer + sequencing software, a stand-alone MIDI sequencing device (equipped with a LCD display screen) or a MIDI keyboard equipped with a built-in sequencer (Music Workstation).

Sequencing software has advantages over hardware; namely, the wider computer screen, easy

upgrades, ease of use, and more workability for separation and assignments as well as more powerful features. Some software sequencers include a printing command or would use a utility program to obtain printed sheet music. The software sequencer will be limited to the capacity of your computer's memory: 128K, 512K, 1MB- 8MB/ external storage. Your sequencer, software or hardware, will have a user manual to guide you through the basic operations. When sequencing musical data via software, it can be entered by real time or step time thus giving you more control and operational options.

Each level of software sequencers contain advanced features and use more computer memory. Broadly speaking, computer software sequencers should have the following features and operational commands that you will need to know. Look for these features when selecting sequencing software.

- Assign any one of the sequencing tracks to any one of the 16 channels.
- Perform auto-correct/quantization.
- Contain punch in/out and auto punch functions.
- Regulate tempo changes and transpose key signatures.
- Program all changes and create file names.
- Perform forward/reverse/search commands.
- Incorporate a variety of filtering options .
- Convert real-time sequencing to step-time files.
- Execute screen editing by using cut, copy, paste functions.
- Song mode to step sequencing and master clock
- Control system exclusive data.
- Save a MIDI file in the universal Standard MIDI File Format in order to be transferred to notation software or other software.

Look for sequencing software with these additional and advanced software features:

- 64 tracks or more that can record play each part of a song on an independent, synchronized and easily editable track.
- Play single parts on up to 8 or more channels simultaneously with multiple instrument sounds playing the same part for rich, sonic textures—a Multi-channel function.
- Request a graphic sequencer, if your computer hardware can handle it. Sequencing would encompass the familiar tape recorder style controls for: playing, recording, stopping, pausing, fast forwarding, rewinding.
- Mix and record volume levels of tracks in real time and on-screen sliders.
- Enter notes with a mouse, trackball or MIDI device with pull-down menus and multiple windows.
- Record while the sequencer is playing to make adjustment and editing corrections or adding new parts to your music.
- Sync the music file to s standard: SMPTE or MIDI Time Code.
- Sequence/Record in different modes; namely, Loop, overdub, auto punch in/out or looped overdub.
- A user and programmable Instrument List for selecting different and specific sounds quickly and easily.
- Automatic adjustments for tempo changes to fit time values.
- The use of a step editor or similar graphics to display a track of MIDI events.
- Complete cut, copy, paste, clear, mix features
- Zoom in/out on MIDI data.
- Select a different meter and beat for every measure.
- Editing features for changing duration, velocity, tempo, and time signatures for tracks and sections.
- Create a song play list for live performance.
- A complete user manual for reference.
- Available technical support for those hard-to-solve problems.

Usually, each manufacturer of sequencing software programs have advantages and disadvantages within their product. A few of the leading companies include: Passport Designs, Twelve Tone, Voyetra, Opcode, Mark of the Unicorn, Big Noise, Dr. T's, Digidesign. When possible, obtain a product demo disk, even if there is a $5.00 charge.

ORGANIZING A COMPUTER-MIDI SYSTEM

Getting started with MIDI is exciting! You will soon discover how a computer-based MIDI system will become a technology work horse for you. This section has been developed to start you off successfully, on your own MIDI journey, and to help you identify what you will need to make it—MIDI music! For reference, see *MIDI Configurations* these illustrations have been provided to show several MIDI-user levels and how your system could be integrated. Each configuration represents a new level in music production ability.

The operational commands for the many different software packages and MIDI products will be explained in detail by the manufacturers' user manuals. These user guides usually supply all the necessary support for operating a specific device. Commitment, practice, and patience will be important learning factors. Within a short time, you will have the computer and software sequencer controlling a MIDI device/s and you will soon learn the ins and outs of your system. You may eventually expand your system by installing additional MIDI gear and building an extensive MIDI configuration.

Identify The Basics

The following questions will help you identify some important start-up basics.

1. What level of music production do you wish to pursue?
(MIDI-user levels can be classified into these three user categories:

- School or amateur use.
- Pre-professional use.
- Professional performance and recording.

2. What is the budget range for your MIDI system? Under $1000, between $2000 and $3000, $5000-$7000 or whatever it takes? Are you including or not including the computer hardware?

3. What is your current hardware and equipment status? Do you presently have a computer and printer and do you want it to be the center of your MIDI system? Is there a MIDI interface and MIDI sequencing software available for your computer? Do you already have MIDI equipped instruments that can be wired in? And last of all, what quality audio equipment is presently accessible? (Amp? Pre-amp? Integrated amp/tuner? Quality speakers 50-100 watt rating? Cassette or multi-track recorder, or DAT?

Note: If you have an Apple Macintosh Plus or higher, IBM-PC/compatible 640K or more, Commodore/Amiga, or Atari ST, these computers have plenty of MIDI support products.

Basic MIDI Systems Components

Budget

Each MIDI-user level has its appropriate price tag. But with a bit of consumer research and using this guide, it is very conceivable that with no start-up equipment, other than a home stereo system, you could organize and purchase a level one (school or amateur) MIDI system for under $2500. You may just find a computer-based MIDI system that should include: computer hardware (disk drives and hard drive and dot matrix printer), MIDI software (sequencing and notation), internal/external MIDI interface, cables, as well as a low-end (priced) MIDI device. You may not be able to purchase top-of-the-line MIDI products like the New England Digital Synclavier, but it may be possible to purchase all pre-owned/outgrown equipment from a user group, computer society, modem /BBS MIDI forum, buyers' guide, or music store.

You may want to consider all brands of computers (Amiga, Atari ST, Macintosh, or an IBM/compatible) that are priced right for your budget, that could possibly have more RAM and speed. Remember, though, for a higher level of MIDI use

some computers are just better for controlling MIDI data. This guide will provide you with suggestions for many manufacturers of MIDI interfaces and software for a variety of computer systems.

One final note about selecting a computer. The computer you use will essentially become the "engine" to your system. Much of today's sequencing and notation software is windows based and uses graphics. You will be doing yourself justice in the long run if you purchase the fastest and most affordable machine with a minimum of 16 MHz operating speed, a minimum of 5 MB of internal RAM, and at least a 40 MB hard drive.

The following MIDI-user levels will provide reasonable guidelines for accounting purposes, assuming that each level will need: a computer system and printer, MIDI software, MIDI interface and a MIDI keyboard.

• Computer-MIDI system for school or amateur use—**tight budget** $2,500.
(Depending upon where and how hard you research, it is very possible to beat this price for a complete starter system—school or amateur. Our recommendation for a starter system: The Roland Canvass with a MIDI controller keyboard or the Roland JV-30, a Macintosh computer system with the StyleWriter Printer, Opcode's EZ Starter pack and Encore notation software.)

• Computer-MIDI system for school or amateur use: $3,500-6000.
(This budget would allow you more flexibility with your MIDI keyboard, and/or sound modules, computer hardware, and effects processor as well as more powerful sequencing software.)

• Computer-MIDI system for pre-professional use: $6,000-12,000.
(This budget would provide you with excellent equipment: MIDI keyboard, computer hardware and laser printer, MIDI mixer, effects processors, top-of-the-line software, and other accessories.

• Computer-MIDI system for Professional performance: $10,000-20,0000+.
(This professional budget will allow you to select high end performance gear.)

Note: A professional MIDI recording studios are available by hourly rates or by the music project. Ask a local music store for studio locations.

Computer Hardware
As previously stated, the leading manufacturers of personal computers that can be connected to a MIDI system include but are not limited to: Apple II (some support) and Macintosh, IBM's PC/XT, AT; Atari ST, the Amiga (plenty of support), and Commodores (some support). If you own a personal computer, chances are, it can be connected to a MIDI interface. Some musicians and professionals use leading computers right from the start. Budget permitting, it may be advisable to upgrade and just purchase a new personal computer with the recommended power.

Some personal computers have superior MIDI software support. The user-friendliness of the software is extremely important for most users including the pro's. Apple computers have been foremost in the early stages as well as in the current stages of the educational-professional MIDI market. Likewise, IBM and Atari ST series have very powerful music software and dedicated third-party developers supporting their use. The Atari ST line has convenient built-in MIDI ports, MIDI IN/ OUT, ready for a MIDI cable and MIDI device. The Amiga is a powerful multimedia machine, but for MIDI there is some professional software available (Dr. T's, Omeaga, orBars and Pipes Pro) but not as plentiful as the IBM and Macintosh lines.

MIDI Interface
One of the most important MIDI devices is the MIDI interface which enables your personal computer to communicate with your MIDI device/s. A MIDI interface is either a hardware card that is snapped into your computer's expansion slots, or if this is not possible, an external MIDI interface.

The connection of your MIDI devices to your personal computer becomes an electronic music workstation.

MIDI interface hardware, snap-in or plug-in devices can range from $49-$199 for Macintosh or IBM. Altech, Apple, or Passport MIDI makes a standard MIDI interface, with one MIDI IN and one MIDI OUT, or MusicQuest sells the PC card or CMS sells a 401 MIDI card both can be found for under $99. For the IBM MusicQuest also manufactures the MQX 32-M that supports 2 MIDI INs and 2 MIDI OUTs and 32 MIDI channels. Opcode makes low end MIDI devices call the MIDI Translator or the Studio Plus 2 that connects to Mac's or to the Apple IIGS. Opcode also manufactures very high end MIDI interfaces called the Studio 4 and 5 with 8 MIDI INs and 8 MIDI OUTS with tape and SMPTE sync options. Sometimes a convenient MIDI Thru-Box (like the ones put out by Cooper) used for connecting a MIDI network are very handy to have. As previously mentioned, Atari ST's personal computers have built-in MIDI interface ports ready to be connected to a MIDI device. Many dealers/manufactures offer packages: Interface + MIDI software. If you plan to organize a MIDI system with several MIDI instruments, purchase a MIDI interface that is made for your computer and intending software use, and an interface with as many MIDI IN's and OUT's as possible.

For IBM/compatibles, Computer Music Supply (CMS) makes upgradable MIDI interface cards that can grow with you. In other words, you can upgrade a 2 x 2 CMS interface card to a 4 x 4 card with SMPTE sync options.

MIDI Software

There is a MIDI software war going on! Prices are down, features are up and Macintosh and IBM are the leaders for selection and availability as well as for a variety of user levels. You will need sequencing software to lay down tracks and to edit/control musical data; notation printing software to obtain sheet music for composition and to see notes on the screen. Some music software, like Deluxe Music Construction Set (Macintosh), allows the user to play in real time or even step time with a MIDI keyboard and mouse and includes a printing command which costs around $100. Cakewalk sequencer for the IBM and a PC MIDI card are bundled and can be found for approximately $179.

Quality sequencing and music notation/printing software such as MASTER TRACKS PRO, FINALE, and Encore, will range from $300 to $700. It is very important to call the manufacturer and obtain a catalog and full product description for your intended use. Registered owners receive technical user support and upgrade information. Many dealers/manufacturers offer packages, namely, the MIDI interface + MIDI software. If you are just starting out, Purchase MIDI software with this point in mind: chances are you will eventually want to expand. (See Applications and MIDI Software for more information.)

In addition to sequencing and notation software, editor/librarian software is an important part of a computer-based MIDI system when you have sounds/patches to create, modify, organize or save to disk. A current trend by the manufactures of editor/librarian software is the development of universal software that will work with a specific computer and most popular MIDI instruments. Obviously, you should call the manufacturer and check if your MIDI instrument is in the list of supported devices. Some of the better choices for editor/librarian software includes but not limited to: Opcode's Galaxy or Galaxy Plus, Sound Quest's MIDI Quest, or Dr. T's X-or.

MIDI Devices

Don't guess! A MIDI compatible device is labeled "MIDI" right on the rear of the case. Many keyboards and electronic instruments on the market today are not MIDI. They may have great sound abilities, user-features, and deserve merit, but still are not MIDI. If in doubt, look at the rear panel of the equipment and find the MIDI ports. The MIDI ports will be clearly labeled. The MIDI-IN/OUT/THRU ports will look like two or three small, round receptacles, a bit smaller than a dime, with

five DIN holes ready to receive the male MIDI plug that has five DIN pins.

Standard commercial MIDI devices and related audio equipment include: MIDI synthesizers, samplers (keyboard and module unit), rhythm drum machines, MIDI controllers, MIDI sequencing hardware, MIDI filters, MIDI mixers, MIDI sync boxes, wind-to-MIDI devices (saxosynth), signal processors, mixdown boards, SMPTE devices, MIDI patch bays, MIDI switches, MIDI Channelizers, and even MIDI lighting controllers. A MIDI-Thru Box allows anywhere from two MIDI INs to four, six or eight MIDI OUTs.

Note: *MIDI configurations are commonly set up without a computer;. A sequencing hardware device controls and coordinates the MIDI configuration thus replacing the computer and sequencing software. But the computer, sequencing software, editor/librarians and notation printing software further expands the usefulness of the system.*

Common features and standards relating to MIDI devices include: Digital and analog based circuitry, usually electronic not electric, polyphonic and monophonic, MIDI ports labeled "IN/OUT/THRU or MIDI IN/OUT," synthesizer keyboards and modules or rack units, sampling keyboards and modules or rack units, with and without wave form editing ability, play only, internal RAM-cartridge/floppy-disk drive for voice librarians. Some MIDI keyboards are even equipped with a drum machine, a built-in sequencer and signal processor. The Korg M1, Roland D-20, and the Ensoniq SQ-80 are older but great, all-in-one MIDI workstations.

Guess what? Just when you purchase your new MIDI devices (synthesizer, sampler, drum machine, signal processors) new product lines continue to be announced quarterly. An option to consider, when purchasing MIDI equipment or top-of-the-line equipment, is to find a music dealer/store that will allow trade-ins and trade-ups—a definite possibility for an individual who experiments with devices and desires to upgrade the system frequently. Unfortunately, you will probably experience a 50% or greater loss for trading in your MIDI equipment. Or, you may wish to keep these devices to build a MIDI configuration using your older equipment as slave devices. Usually a MIDI configuration will consist of one high-quality synth/sampler and several of these older devices.

A feature-rich, top-of-the line synth, sampler keyboard or keyboard music workstation will range from $1500-$2800. Some keyboards priced under the $700 range are equipped with rich, fat sounds but only contain pre-sets and are not programmable. Other keyboards with a higher price tag include pre-sets that are programmable with every imaginable function. It is usually a good idea for a beginner to read about and generally understand the fundamentals of synthesized sound. MIDI keyboard-synthesizers are very complex and it is possible for a new user to "over purchase" and acquire a synth that may be too advanced and difficult to fully understand.

A common path to take is to purchase easier-to-use MIDI equipment at first and then grow into more sophisticated and expensive units. The advanced series of Kawai, Yamaha, Roland, Korg, and Ensoniq synthesizers and sampler keyboards are full-function musical instruments with champion features. These advanced series are a tough place to start and are not usually recommended for the beginner—but mastering them should be a goal for any serious user. The Casio CZ and HT MIDI line of synthesizer keyboards is one of the most popular lines for beginners and students.

Printer

Using a printer with a computer-MIDI system is simple. The software will contain a print command. You will use either a dot matrix printer or near letter quality that will give you a slow printout of fair to good quality, or a laser printer that will be quick and provide a high-grade print of sheet music. A dot matrix printer can be purchased for as low as $300 and a laser printer can be found for as low as $1400 (i.e., the NEC laser printer lines). If you intend to use a laser printer, check to see if your

MIDI software is laser-compatible and if post-script language is needed.)

Audio Equipment

If you are organizing your computer-MIDI system on a tight budget, the average home stereo can be used for a school or amateur MIDI system if necessary. Some miscellaneous RCA cables, stereo jacks, MIDI cables, and low pass filtering may be needed. In addition, if you intend to produce recordings, a mixer and multi-track recorder are important audio components. These audio devices are used for recording, controlling, and separating the tracks. You should consider the quality of sound, the amount of power you need, and the amount of wattage of your speakers.

A wide variety of audio accessories are available and can be used in your MIDI configuration: multiple amps, reverb units, digital delays, graphic EQ's, and patch bay connectors. Each sound quality you are searching for will have a price.

For pre-professional or professional recording, only name brand studio-quality amplifiers/pre-amps, mixers, mixdown decks, multitrack recorders, speakers and other recording high-end audio equipment can be used to capture the sound quality. A professional MIDI recording studio will provide the best results.

Connecting MIDI Devices

All MIDI connections use a special five-pin DIN, MIDI plug and receptacle. Follow all recommended manufacturers' guidelines for connecting your specific MIDI gear. When three or more devices are connected (as in a straight daisy chain via a MIDI THRU port) timing glitches in the entire MIDI system can occur. *Solution*: MIDI THRU boxes have 2 INs and 4 OUTs or 4 INs and 8 OUTs or better yet, a 1 x 3, 2 x 6 or even an 8 x 8 MIDI interface are recommended for your MIDI connection of multiple devices and for future additions to your MIDI system, *(See Chapter Three: MIDI Configurations).*

MIDI CONNECTIONS

The following illustrations will show the basic connections used in the MIDI communications link. All MIDI equipment, interface hardware, thru boxes, and switches use the standard five pin MIDI port/cable connector.

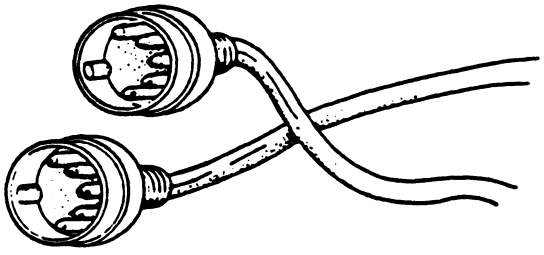


Figure 1

Five pin DIN MIDI cables used to connect MIDI devices

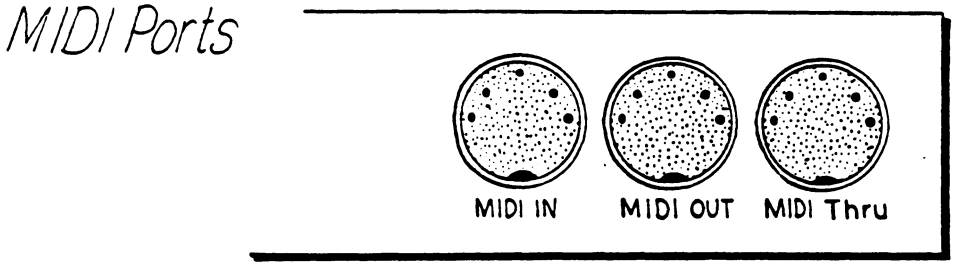


Figure 2

MIDI connection ports found on MIDI devices

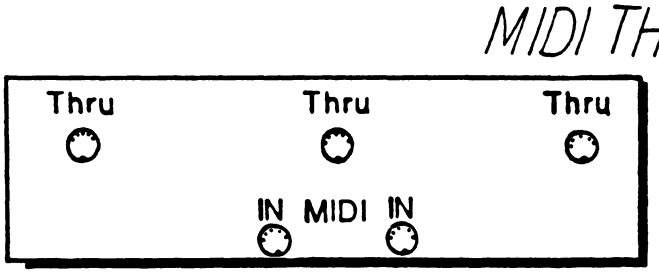


Figure 3

MIDI THRU Box is used to connect multiple MIDI devices instead of a daisy chain

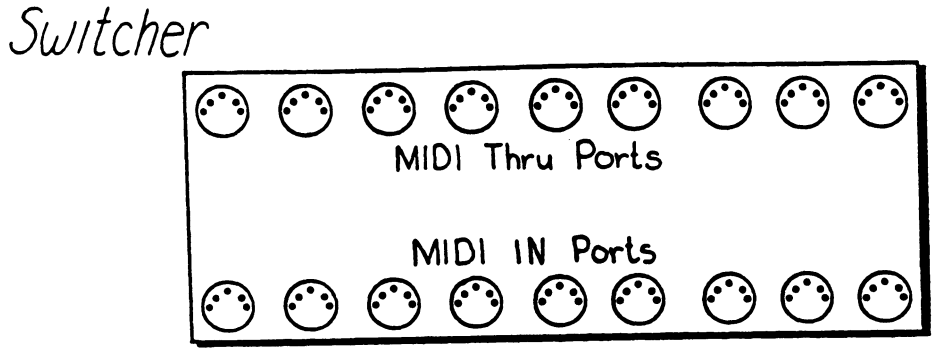


Figure 4

MIDI Switcher, like a MIDI THRU Box, connects additional MIDI devices

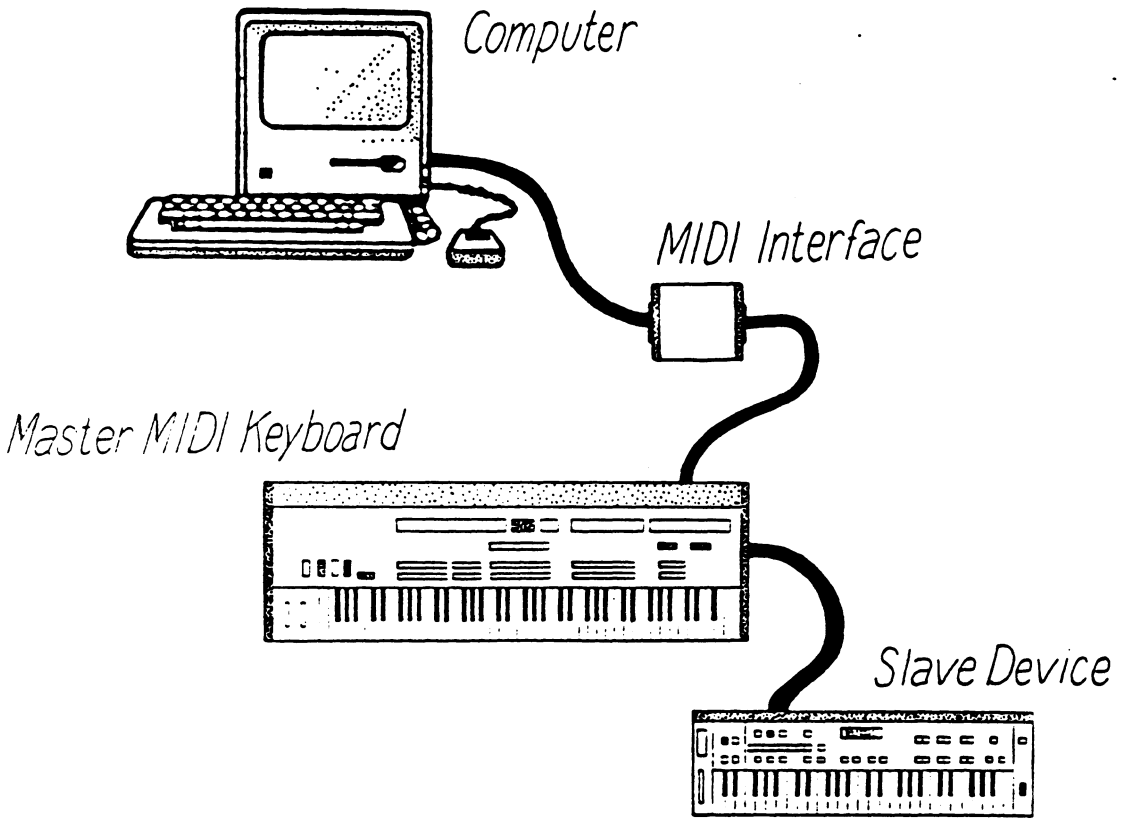


Figure 5

MIDI connection: Computer + MIDI interface + Master MIDI keyboard + Slave device

45 HELPFUL GUIDELINES & BUYING TIPS

This section, *45 Helpful Guidelines & Buying Tips,* has been developed to help you gain insight into some key points when getting started with musical electronics, MIDI, computers, software and purchasing.

1. Decide relatively early, in your developmental/ computer and add-on hardware purchasing stage, whether you want to make music with a musical computer (i.e. add-on hardware, SoundBlaster/ SoundBlaster Pro, or Audio Spectrum for an IBM/ compatible) or just connect a MIDI interface for approximately $99 to your MIDI keyboard and then select sequencing software. MIDI is the professional choice but computer and add-on sound cards are quickly finding their place, if not already, in the studios, educational, and home markets.

2. Think ahead—develop a "plan of action" with specific short-range and longer-range goals for your budget, software and hardware purchases, self-development, and MIDI equipment needs. Develop a system that can be added on to when you are ready. Remember, for a small investment, a start-up MIDI interface and sequencing software can be purchased for approximately $179-$299 for an Apple II, GS, IBM/compatible, Amiga, and Atari or Laptop PC.

3. When selecting a personal computer, these important options should be considered: open-architecture hardware designed for upgrades and add-on hardware options (i.e. any Macintosh II series computer can use Mark of the Unicorns add-on digital hardware); internal operating speed of 16 to 50 MHz; use of multi-task operating system/ software; large variety of quality user-friendly MIDI sequencing, notation and other productivity software with graphic and mouse/trackball support; built-in MIDI port or MIDI interface hardware availability; regularly published computer-specific user magazines for support and new product information; a quality monitor with great resolution—color/ black and white; amount of internal RAM (i.e. 2-8 MB is common for Mac's and IBM's); amount of internal RAM needed for specific MIDI sequencing and notation software (i.e. IBM's need to have 2MB of RAM and using Windows in order to run Encore notation software by Passport Designs); user level, RAM upgrade costs (i.e. laptops computer RAM is usually a bit more expensive that desktop machines); user interface for all age level that would be exposed to any computing (i.e. basic input is either keyboard or mouse) the number and the availability of leading MIDI software for composition, sequencing, voice librarians, and, of course, the cost. Usually, you will trade off and purchase a system that will have more advantages than disadvantages. Manufacturers of personal computers that are used for music include: Apple's II, GS, and Macintosh Plus, SE, II; Atari's ST, IBM's PC, XT, AT, and Commodore's Amiga and laptops, etc. (Laser computers, the Apple II clones, are not compatible with Passport/compatible MIDI interface snap-in cards and Apple II MIDI software SuperSequencer and MusicWriter)
(Rumor has it that some IBM/compatibles are not always 100% compatible with MIDI interfaces and MIDI music software; always check with the manufacturer.)

4. Purchase wisely. The electronic music industries are always coming up with something new, double check your references before you purchase; the "great deal" may not be so great after all. The dealer may want to reduce its inventory. Call the manufacturer directly and ask about new releases.

5. Usually, never purchase from the manufacturer or you'll pay the list price—ask the manufacturer for the closest authorized dealer of their products

and seek the same product for a discount price. (i.e. Sound Management 800-548-4907 is an authorized dealer for most of the leading MIDI software manufacturers.)

6. Some personal computers are just better MIDI computers (Apple's Macintosh, IBM's PC's, Commodore's Amiga, and Atari's ST); likewise with a stand-alone musical computer, few are recommended. The Apple IIGS is a wonderful musical computer but has little software support.

7. Keyboards, synthesizers, and other musical electronics are not always MIDI devices. Keyboards are found in many flavors and most merchandise and piano/keyboard/music stores sell a variety of these musical instruments. Non-MIDI keyboards are very intelligent in their own right, but are not a MIDI device. Non-MIDI keyboards have such features as: polyphonic or monophonic sound (play one note or several notes at one time), preprogrammed musical rhythms, auto-chord play with one note, sampling ability, multi-timbral, built-in drum kit/s, etc. These keyboards are usually intended for home or school use and are non-MIDI. Always see what the cost difference is—between a nonMIDI keyboard and a low end MIDI keyboard. You may be able justify the difference and use its MIDI ability in the future.

8. A musical device must be labeled MIDI; to be sure, *check* the back panel of the device and look for ports (about the size of a dime) labeled MIDI IN, MIDI OUT, and some have MIDI THRU.

9. A beginner can start out by purchasing well-know MIDI software with plenty of support as well as an easier-to-use MIDI synthesizers (i.e. Roland JV 30). At first, learning can be slow eventually the user will want advanced, sophisticated and more powerful and expensive MIDI software and hardware. Note: Surge suppress all your computer and MIDI equipment against AC voltage spikes and brownouts.

10. Purchase and set up equipment that has a well-known reputation as indicated in this guide. Don't hesitant to order from companies that are not local; next day or two-day mail is standard shipping practice; use a credit card for convenience and for returning products if necessary.

11. The well-known Ensoniq, Kawai, Peavy, Roland, Korg, Yamaha keyboard product lines offer amazing MIDI keyboards and accessories packed with powerful features: Preprogrammed sounds and beats, RAM Sound Cards, additional memory options, and built-in sequencer for track recording options, and even playback of prerecorded music recordings (Yamaha digital pianos, 3.5 disks). The advanced series of Korg, Yamaha, Roland, and Ensoniq synthesizers, to mention a few, are usually for experienced and professional use; a new user will be very challenged, *(See Chapter 6, Understanding MIDI Musical Devices).*

12. Know the categories of MIDI devices. The world of MIDI devices includes but are not limited to: MIDI sound modules and MIDI keyboard controllers, MIDI drum machines and rhythm machines, MIDI recorders and sequencing hardware, MIDI signal processor, or phase distortion devices, MIDI effect devices, MIDI guitar systems, MIDI bass and string controllers, MIDI mixers and network devices, MIDI THRU Boxes, as well as MIDI woodwind instruments and MIDI synthesizer and MIDI keyboards.

13. Generally speaking, music software can be categorized as follows: NonMIDI music software used for home music entertainment and music education, and music software to support add-on sound cards. The other major category is MIDI software. MIDI software includes: MIDI education software for computer assisted instruction for music skills, ear training, and fingering; composing software; sequencing software; performing software; automatic accompaniment/intelligent software, and software for computers with built-in or added on sound cards.

14. Know what features you want in a MIDI sequencer: A stand-alone sequencer that is non computer dependent or sequence software used with a MIDI interface and a MIDI keyboard. Try

to obtain a demo disk from the software sequencer manufacturer. The demo disk will be a good representation of the features of the sequencer. How fast you get you demo, the service, and any support you may need may tell you about the manufacturer.

16. When using sequencing software with advanced features, do not become frustrated easily. Use the software manual, call tech support; learn to take small steps rather than large ones. Keep a record or write notes and numbered steps for setting up certain procedures, and break throughs you discover—becoming an electronic musician is not an overnight occurrence.

17. Structure/establish a specific part of each day for continuous development and practice; soon you may find yourself totally absorbed in your new discoveries.

18. Many new MIDI users report this phenomenon when studying musical electronics: after a sufficient amount of time of total confusion, suddenly everything becomes clear.

19. Find local user groups for support: music schools, and colleges are good sources. Consider receiving professional MIDI tutoring and consulting from experienced users.

20. Subscribe, send away, write to the major manufacturers and software publishers and request new development updates/releases, newsletters, free informational literature as well as the recommended learning/reference guides and materials for your specific equipment.

21. Use a modem to your advantage: for information, development, and for MIDI troubleshooting. In many major US regions (e.g., Boston, New York, mid-west, California) MIDI bulletin board services are active and are extremely helpful.

22. This guide does not include all the information you will need. Purchase several other MIDI books that are recommended in this guide. Most learning takes place with hands-on practice.

23. You do not need to fully understand how to create and program sound patches within your synthesizer; most name brand synthesizers/samplers have hundreds of voice librarians available.

24. When starting out or upgrading you hardware or software, know the "top ten" MIDI products—software and hardware and how long they have been on the top; a change is inevitable.

25. Always ask plenty of questions when selecting or learning about MIDI equipment and computers, and learn to use the buzzwords in the field of musical electronics before hand. *(See List of Computer and Electronic Music Terms)*

26. No one MIDI system is a hundred percent perfect. No one MIDI system can do all for all users. But, a carefully planned out computer-MIDI system with the right software for notation and sequencing as well as MIDI equipment combinations can come very close!

27. Learn to be flexible; no technology is perfect and MIDI has its own limits. MIDI equipment and instruments' specifications used today will change tomorrow along with the software.

28. If you are purchasing a keyboard form a local dealer, fully test, use, and understand the equipment before you purchase. Know the overall quality of the sound and tone colors you desire. Judge the fullness or thinness of the instrument's sound and user features? Whether you are purchasing from a local dealer or not, find out the return policy for equipment that has not meet up to your expectations.

29. When starting out or upgrading your system, make a "wish list" of all music management functions you want your MIDI equipment and software to perform. Keep your "wish list" handy when investigating new products—this will guide you in the right direction and help you select the products you actually need.

30. Continue to keep up to date with the industry—read and subscribe to several user periodicals to

help you make wise selections for the proper hardware and software. Electr*onic Musician* and *Keyboard Magazine* contain excellent feature articles about the business of making MIDI music. Watch for articles that signify change in user trends and new MIDI equipment releases.

31. Plan your budget with this point in mind: You may spend more money than you originally planned so spend wisely!

32. More often than not, the well-know MIDI dealers and software dealers can provide competitive pricing over the manufacturer and can put "package deals" together for you (MIDI interface and sequencing software).

33. For a basic computer-MIDI system, including computer—software—MIDI keyboard—MIDI Interface, approximately $1,700-4,500 will be an important budget amount for your consideration. An Apple Macintosh or IBM/compatible system can be in this range. This wide price range will account for high end or low end computer hardware, software and quality of the MIDI keyboard you are seeking.

34. Build a budget ratio: 30:30:40 is recommended for establishing a MIDI budget. 30% for a synthesizer/sampler, 30% for audio equipment, and 40% for computer, software, and countless accessories. If you have a functional computer then more can be spent on your master synthesizer, MIDI equipment, and software.

35. MIDI keyboard and synthesizer trade-in and trade-up for credit is sometimes an option with music stores—this should be considered by schools and individuals experimenting with devices.

36. MIDI product knowledge is one the most important buying tips for the beginner. By knowing your product line-ups and what each can do, you will gain the most out of your budget ratios. Visit music dealers and play with the demos, obtain spec. sheets, and product literature.

37. If product support/training is not an issue, check the pricing from as many MIDI instrument and hardware dealers as possible. Shipping MIDI gear is standard practice by these businesses.

38. Once you have completed product clarification on a specific item, and you know what you want and what it will do, start calling the many different purchasing resources and check pricing, availability, and listen for other important recommendations before making the final purchase decision.

39. New MIDI equipment is released monthly, many of the standard MIDI devices manufactured by Roland, Korg, Kawai, Yamaha, Ensoniq, E-MU, etc. can meet the needs of most users. Try not to over purchase; you may not need all the features found in the high-end keyboards and MIDI devices.

40. All-in-one MIDI devices like keyboard music workstation, synths, drum machines, and sequencers have many advantages. This integrated unit can be right for the user with a limited budget or for a musician looking for a system that serves as a workstation for creating/composing away from the studio. Schools would be interested as these devices are easy to set up for classroom use.

41. If creating synthesized waveforms is not an important goal, MIDI sampler keyboards are packed with rich clear tone colors. The Ensoniq Performance Samples and the Roland Sound Canvass are worthy of a test run.

42. A beginning budget does not have to include every component of your MIDI system. A MIDI system can and should be built in stages. MIDI systems can always be expanded with a MIDI Thru Box, modules or software for notation or software universal editor/librarians for sound management.

43. Your budget should contain a spot for an audio signal processor. This money will be well spent when you add real effects to your MIDI music. Delay or reverb devices are a popular choice.

44. Your MIDI software sequencer may be confusing at first. You are better off purchasing a product that you can grow into and will also meet your needs in the future. It will take some time for you to learn the in's and out's of your sequencer. Technical support is a way of life.

45. When calling for technical support, be one step ahead! In other words, have the computer, software, MIDI devices all booted up ready to go. When its your turn for tech. support, have a note pad ready for instructions and then actually perform the tasks that the technicians suggests. If the information suggested is not your solution, you will not have call back—keep the technician on line until you are satisfied and you know what you are doing.

MIDI STARTER SOLUTIONS

The following information represents best-seller solutions for setting up a MIDI workstation. The MIDI STARTER SOLUTIONS list is organized by computer type, interface needed, general keyboard and/or module manufacterer only, software sequencer, and software notation. Several suggestions have been given to provide for choice as well as for budget considerations.

COMPUTER	INTERFACE	KEYBOARD/ MODULE MFG.	SEQUENCER	NOTATION
IBM/compatible	MusicQuest PC Card	Roland, Kawai	Cakewalk	QuickScore
	MQX-32M card		Sequencer Plus Gold	Encore
	CMS 401 card	Casio, Yamaha	Cadenza/Windows	Finale
	CMS 444 card	Ensoniq	MasterTracs Pro	Score
	Voyetra V22-M		Prism	Musicator
			Trax	Ballade
Macintosh	Altech 1x3	Roland, Kawai	Vision	Encore
	Altech 2x6	Casio, Yamaha	MasterTracks Pro	Finale
	Opcode MIDI Translator		Trax	MusicTime, Music Prose
	Opcode Studio Plus 2, 3, 4, 5	Ensoniq	EZ Vision	Concertware+ MIDI
			Performer	Composer, Mosaic
PowerBook 100/140/170	Opcode MIDI Translator	Same As Above	EZ Vision	MusicTime
	Serial MIDI Interfaces may need software fix		Pro 5	Finale
	(Check with manufacturer for compatibility)		Trax	Encore
			Performer	MusicProse
Amiga	Dr. T's Model-A MIDI Interface	Same as above	KCS Omega	Copyist Appr.
	Golden Hawk MIDI Gold 500		Tiger Cub	Blue Ribbon:
	Golden Hawk MIDI Gold Insider		KCS Level II	Bars & Pipes/ Pro
Atari ST	Uses own MIDI Interface	Same as above	KCS Omega	Notator
	Some software requires a doggel		Creator	Dr. T's Copyist
			Cubase	
IBM Labtop	Key Electronics: Serial Interface MIDIATOR		Cakewalk 4.0	Quickscore
			Call for compatibility	
Apple II+IIe GS	1x2 MIDI Interna, Sentech	Same as above	Glasstracks-Apple II+	No Notation
	1x2 MIDI, Internal, Sentech with Tape Sync		Supersequencer/ Dr. T's KCS	MusicWriter
Apple IIGS	External MIDI Interface: Altech, Opcode, Apple		MasterTracks Jr or Pro	MusicWriter
Com 64/128	Sentech Electronics: 1x2 MIDI	Same as above	Glasstracks	No Notation
	1x2 MIDI Card with Tape Sync		SuperSequencer	
			PowerStation, Dr. T's KCS	

COMPUTER AND MIDI SYSTEM
PLANNING FORM

The following planning forms will help you determine what equipment you will need as well as how much it will cost.

COMPUTER SYSTEM:
Cost projection for entire computer system? $1000, $2000, $3000, $4000, $5000, $6000+
Notes:

Manufactuer and model of computer system desired? First Choice? _____

_____ Second Choice? _____

Used? _____

Amount of computer internal memory needed? 1MB, 2MB, 4MB, 5MB, 8MB, 10 MB+ RAM.

Amount of external memory/storage desired? _____ RAM.

Number, kind, and size of floppy drives? (5.25/3.5) _____

_____

Manufactuer and Model of Hard drive?_____

Size of hard drive or removable drive needed? 20 MB, 40 MB, 60, MB, 80 MB, 100MB, 120MB, 200MB+

_____

Name of CD ROM? _____

Name and model of printer? _____

Quality of print desired? Dot matrix quality, Letter quality, Laser quality. _____

Laser printer name and model?_____ Cost? $_____

Other Printer Options name and model?_____ _____ Cost? _____

SOFTWARE:
Cost projection for start-up software? $300, $500, $700, $1000+
Notes:

Name of MIDI software for sequencing, Version)? _____Cost$ _____

Composition software (Version)? _____Cost$ _____

Music printing sotware (Version)? _____Cost$ _____

Other music software (Version)? _____ Cost$ _____

Other software for word processing, spreadsheet, data base, financial, learning, creativity? Cost $_____

Notes:

MIDI EQUIPMENT:
Cost projection for entire MIDI system? $1000, $2000, $3000, $4000, $5000, $6000+
Notes:

Name of manufacturer and model of MIDI Interface? _____
Notes:

MIDI switcher box? _____

MIDI Thru Box? _____

Brand name of MIDI synthesizer/s make and model? _____

Brand name of MIDI sampler/s make and model? _____

Brand name of MIDI drum machine/percussion? _____

Hardware sequencer? _____Mfg. and Model_____
Notes:

MIDI module/s, controller/s? _____
Notes:

Other MIDI or Multimedia equipment? _____
Notes:

_____

_____

AUDIO EQUIPMENT:
Cost projection for entire audio system? 500, $800, $1000, $2000, $3000, $4000, $5000, $6000+
Notes:

Name of manufacuter and model of power amp?_____

Name of manufacturer and model of pre-amp? _____

Name of manufacturer and model of integrated amp? _____

Name of manufacturer and model of DAT player? _____

Name of manufacuter and model of multi-track recorder? _____

Name of manufacuter and model of speaker system?_____

Name of manufacuter and model of mixer? _____

Outboard devices--audio signal processors: Reverb effects? Delay effects? Equalizer? Other devices?

Miscellaneous supplies? Tapes? _____, RCA cables? _____, Tools? _____, Misc?_____

Special Notes & User Information:

INTERVIEW FORM
Electronic Musician

Best resources for identifying components of a MIDI system are MIDI consultants, musicians, and MIDI dealers.

BACKGROUND DATA:

Name _____ Phone No: _____

How long have you been a musician? _____ What instrument do you play? _____

How long have you been using MIDI equipment? _____

Why did you become interested in MIDI?

_____

How long and how did you learn best to use your MIDI equipment and system?

_____

Approximately how much money have you invested in the MIDI entire system?
$_____

Recommendations for learning a new MIDI system? _____

_____

Recommended Computer System Description:
(Mfg., Model, Memory, Printer, Software)

Recommended MIDI System Descriptiion:
(Mfg., Model, Synth, Samplers, MIDI interface, Drum machine, Mixer, MIDI Sotfware)

Resources for a beginner, professional, educator:

Books? _____

Catalogs? _____

Other Supportive Information?

Interview Form Continued

Magazines? _____

Contacts? _____Demo's? _____

Music Dealer Recommendations? _____

Telephone Numbers? _____ _____ _____

Other Suggestions/recommendations?_____

Notes:

MIDI System Sketches or Configuration Drawings:

Chapter Two: Applications & Music Software

Applications of Musical Electronics
Understanding Music Software
MIDI Software I
MIDI Software II
Music Education Software & Resources

APPLICATIONS FOR MUSICAL ELECTRONICS

The applications of musical electronics are relative to the user's budget, equipment, and musical-technical knowledge. Mostly, MIDI equipment and musical computers become tools to compose, generate, record, print, or teach music and theory. Computer-based music systems enable you to accomplish greater musical tasks that would otherwise be too expensive or time consuming in comparison to traditional methods.

Basic Applications For A Computer-based MIDI System

- Compose and play music in real time and step time.
- Print sheet music and lyrics--dot matrix or laser print publishable quality.
- Sequence, edit, and maneuver musical MIDI data.
- Record and playback saved accompaniments or customized data.(i.e. scale drills or ear training drills, or music for practice and accompaniment)
- Store and control a variety of sound patches/librarians.
- Sample and design sound files.
- Synchronize musical data to film and video soundtracks. (SMPTE)
- Control a variety of external devices (Mixing boards, controllers, lighting, modules, signal processors).
- Live performance.

Basic Applications For A Stand-alone Musical Computer.

- Explore new musical ideas, concepts, and theories.
- Compose music using standard pull-down commands: note value, copy, paste, cut, move, instrument selection, etc.)
- Create/select digital instrument sounds file for music composition.
- Print sheet music and lyrics. (i.e. mouse input technique)
- Digitize, edit, and playback any audio sound that has been input.
- Alter/edit digitize sounds for custom music files.
- Develop custom sound files for programming of specific synthesizers.
- Engineer new sounds through digitizing hardware and editor software.
- Playback music and sound files. (Sound card installation necessary)
- Hard disk recording. (i.e. StudioVision AudioMedia)

Educational Uses For MIDI and Musical Computers

- A personal computer and a synthesizer are learning tools in themselves.
- Train, drill, create, explore classroom music ed. values, program goals and objectives..

• CAI (Computer Assisted Instruction) for drills, finger training, ear training, MIDI tutor/keyboard training.
• Compose, practice create accompaniment and practice for a variety of classroom and home training settings.
• Print sheet music for new or practice parts.
• Encourages user to compose original music.
• Supplies motivation for advanced and gifted students as well as provides motivation for less achieving or successful students..
• Versatile equipment for a variety of ages and performance levels and styles of music.
• Versatile MIDI and music software for all grades and user levels.
• Create custom sound libraries/waveforms for advance use.
• Make a recording for a class project, special event, or commercial jingle.
• Create a sound track for use in a multimedia presentation or course project.
• Provide challenge for the gifted and talented or motivation to slow achievers or unmotivated.

The Musical Computer or a MIDI System?
There are advantages and disadvantages of both systems. However, usually, MIDI-generated sound is far superior to computer-generated sound. MIDI equipment has been designed to be dedicated to the sole purpose of producing high quality digital sound. Specific musical computers, like the Apple IIGS, has been developed for multiple applications, and their sound ability is just one function. Primarily, the IIGS houses a special music chip for synthesizing called the "DOC" that will produce tone colors for a pre-determined user market. Some hardware and software "reviews" suggest that the IIGS is primarily a musical tool for education and home. In addition an IBM system configured with a sound card can use sound files downloaded from a local BBS is interesting option.

As this technology continues to develop, the cost of MIDI and electronic devices continues to drop and becomes affordable to the average consumer in which case more schools are implementing the new technology for introductory or advanced music training. Musical computers are an easy setup but are generally limited; a MIDI system will require more user effort. A MIDI system will have hands-on use with a computer, MIDI keyboard or MIDI instrument, mouse, software. *(See Chapter Five: Innovations and Product Descriptions, for additional options for add-on hardware for computers.)*

The applications of musical electronics are basically dependent on the proficiency of the user, the quality of equipment, and the degree of implementation. To achieve advanced-user ability, much information needs to be processed. There are numerous well-written manuals, guides, instructional tapes, and BBS MIDI forums available to help. Usually the development of electronic musicship is greatly assisted by the software manuals, MIDI equipment manuals, mini courses/lessons/consulting, and hands-on experience. *(See Chapter Seven: Resources for Development and Purchasing.)*

UNDERSTANDING MUSIC SOFTWARE

The leading developers of software are ingenious and devoted to their field. The continuous development of specialized music software has rapidly changed the rate of progress of the electronic music movement; thus, a wide selection of amateur, educational, and professional programs exist for all levels of musical interests. IBM and Macintosh platforms are the leaders in the selection and range of MIDI-based software; Atari and Amiga are next with the Atari ahead. Software suggestions made in this guide generally apply to most major name brand personal computers, unless that specific program is exclusive to that computer or model.

MIDI-based software is developed for a predetermined user group or purpose; namely, to assist you with composing, notation printing, and sequencing, in editing and managing music or sounds/patches and being an editor/librarian of specific instrument sounds/voices, to assist in learning music instructional software ,CAI, Computer Assisted Instruction, or software to help us be creative and to make music without being a musician, AI, artificial intelligence music software.

To further clarify these divisions of music software, these categories can help: Non-MIDI music software for composing and printing, instructional/educational, entertainment and utility programs to support add-on sound cards or MIDI-based software (computer, MIDI interface, and MIDI instrument required) for music instruction/CAI, composing/printing sequencing, performing, AI, and music software specifically designed for computers with independent sound capabilities.

With a little time spent browsing through software catalogs and reading computer magazines, you will soon understand what music software should be used for a specific application. Get opinions when selecting software to meet specific goals.

The evaluation of computer software is a skill in itself. It would be ideal if all software could be used for a month or two and then, purchased if desired, but this is usually not the case—the questions that remain are: *"How good is the software for intended use? How fast can I learn it and achieve advanced user ability?"* A good idea is to make a punch list of tasks you wish you could do faster and more efficiently and with greater control and flexibility. This list will guide you in the selection of the right software. To find the right one for your needs, it is quite common to experiment with several less expensive packages. Users have indicated that having success and motivating results with an easier-to-use version of music software is better than facing a slow-unmotivating and steep learning curve with the top-of-the-line version. Then, again, the more powerful version (i.e., Trax vs. Master Tracks Pro or EZ Vision vs. Vision or Studio Visision) will allow the user greater depth and more powerful features.

When selecting any kind of software always read the reviews, actually preview and use the software from a local dealer. If this is not possible, (mail order) find out the return policy for the software that does not meet up to your expectations—usually there isn't one. When you have found the right software, you will know! It may take you several software purchases and learning experiences. Some computer dealers have established rental software programs for a small fee that is used toward the potential purchase.

Computer software also offers fascinating options for non-musicians. A beginner can become an amateur sound engineer or MIDI jockey and explore and play prerecorded/presequenced music on disk. *(See Chapter 5 Innovations and Product Descriptions)* You will need to use a reliable MIDI sequencer software package, one that can read the Standard MIDI File Format, then select a specific style of presequenced music, Top Forty Tunes for example, and use your keyboard/module and sound system to engineer and playback the music. You will truly enjoy and learn a great deal. In addition, creativity music software has programmed artificial intelligence (AI) to assist in music composition, Band-in-a Box, M, or MusicMouse, Sound Globs, Hyperchord, Pixound, or other similar products are available for those with little music background or limited ski lls or just seeking a software adventure..

MIDI SOFTWARE SUMMARY I

Atari, Mac, IBM/Compatibles, Amiga, Commodore, Apple IIe, II+, GS
Sequencing, Notation, Editor/Librarin, Other

ATARI ST & 1040

Band In A Box
C-Lab Human Touch
C-Lab Explorer M1
C-Lab Explorer 32
Creator 2.2
Cubase by Steinberg
Dr. T Copyist
Dr. T D-50 Edit/Lib
Dr. T FX-Pac 1
Dr. T Guitaristics
Dr. T KCS
Dr. T Level II w/MPE
Dr. T M-1 Edit/Lib
Basic/Pascal
Dr. T Proteus Editor
Interval Music Sys K1/K4
Hybrid Arts Edit Track
Hybrid Arts SMPTE Track II
Hybrid Arts Gen Edit
EZ Track+
Genwave Univ.
M by Intelligent Music
Master Tracks Jr.
Master Tracks Pro
Midisoft Studio Adv.
MIDI Quest Generic Editor
Notator 3.0 (Soft Link)
Notator/Unitor SMPTE
Opcode Proteus Editor
Protozoa Proteus Editor
Steinberg K1 Editor
Sound Designer II SK
Steinberg 12
Steinberg Time Lock
Steinberg M1 Editor
Super Librarian
Tiger Cub by Dr. T
Turbo Synth
XOR by Dr. T

Apple IIe/II+, GS

Super Sequencer IIe/GS
GlassTracks II+, IIe
MusicWriter Level 1, 2, 3
Mastertracks Pro or Jr
ECS Educational Software
Dr. T's KCS Sequencer

IBM

Ballade
Band In A Box
Big Noise M1, Multi D Editors
Cadenza/Cadenza Windows
Cakewalk Pro or Windows
Cakewalk 3.0 w/PC Midi card.
Dr. T Copyist Levels I & II
Finale, MusicTime or Encore
Key Elec. Laptop Interfaces
Laser Music Processor
Master Tracks Pro
M/PC
MQX-32 w/cakewalk Pro
CMS 401 Interfaces
Music Quest Interfaces
Music Printer Plus 3.2
Musicator 2.0
O-View Proteus/ O-View VFX
Personal Composer
Prism
Roland MPU w/Cakewalk
Sample Vision
Score & Escort by Passport
Sequencer+MK 11 w/V-401
Sequencer+MK 111 w/V-401
Songwrite IV
Roland MPU-IMC
MIDI Quest Generic Editor
Super Librarian
Syntonic K-5 Ed w/1000 snds
Voyetra MIDI Pak Plus
Miracle Piano System
Voyetra V-4001 Interface
XOR by Dr. T

AMIGA

Bars & Pipes Pro
Dr. T Copyist
Dr. T KCS Sequencer
Dr. T Omega Level II

Commodore 64/128

PowerStation
Dr. T's KCS
SuperSequencer
GlassTracks
DynamicStudio
ECE MIDI Interface
M by intelligent Music
Master Tracks Pro
Music X
Soundquest Editors
MIDI Quest Gen.Editor
Take Note
Tiger Cub by Dr. T

MACINTOSH

Alchemy 2.0
MuisTime
Altech MIDI Interfaces
Altech 1x3, 2x6 MIDI
Beyond by Dr. T
Cubase
Deluxe Recorder
Encore
EZ Vision
Finale 2.0
Mac Nexus J.LCooper
M/OVALTUNE
Mibac Jazz
Music Prose by Coda
MIDI TimePiece
Opcode Galaxy
Opcode Pro Interface
Opcode Proteus/XR
Performer, Mosaic
Protozoa Proteus
MasterTracks Pro 5
Trax, AudioTrax, TurboTrax
Pro Composer
Studio 3 Interface
Studio + II Interface
Super Librarian
Timecode Machine
Turbosynth 2.0
Upbeat 2.0
Opcode Vision
Miracle Piano System
Opcode Studio Vision
Mark Unicorn-Digital Performer

MIDI SOFTWARE SUMMARY II

Computer, Software Type and Manufacturer*

MACINTOSH

Sequencers
Dr. T's
Beyond
Mark of the Unicorn
Performer or Digital Perf.
Passport Designs
Master Tracks Pro
Trax or Audio Trax
Passport Pro 5
Opcode Systems
StudioVision Audio Media
Vision, EZVision
CUE-The Film Music System
Electronic Arts
Deluxe Recorder
Integrating Sequencing and Printing
Coda
Finale
Passport Designs
Encore, Trax
Coda
FinaleMusic Prose
Scoring and Printing
Mark of the Unicorn
Mosaic
Passport Designs
NoteWriter II
Music Software Plus
Music Publisher 2.0
Electronic Arts
Deluxe Music Construction
Interactive Compostion
Dr. T's
Jam Factory
M
Ovaltune
UpBeat
Beyond

Apple IIGS
Pyware MusicWriter 1,2,3
MIDIMate,SysEXGS, GlassTr.
Passport Mast.Trcks Pro/Jr.
ECS, Trimbelle, SuperSeq.

Macintosh continued
Editor/Lib-Samplers
Digidesign
Turbosynth
Softsynth
Passport Designs
Alchemy 2.0
Education
Ars Nova
Practica Musica
Trimbelle
Complete Series
MIDI Interfaces
Opcode Systems
Pro Plus, Translator
Studio Plus Two
Timecode Machine
Studio 3,4,5(SMPTE)
Mark of the Unicorn
MIDI Time Piece II
Performer, Composer

IBM PC
Sequencers
Passport Designs
Master Tracks Pro
Trax
Voyetra
Sequencer Plus or Gold
Twelve Tone System
Cakewalk
Cakewalk Pro/Cake Windows
Magnetic Music
Texture
Prism
Integrated Sequencing and Printing
Personal Composer
Personal Composer System/2
Dynaware
DynaDuet, Ballard
Temporal Acuity
MusicPrinter Plus
Musicator
Musicator
Coda
Finale, MusicProse

Scoring and Printing
Dr. T's
Copyist, QuickScore
Passport Designs
Score, Encore, Trax
Interactive Composition
CoolShoes
Sound Globs
Drummer

Editor/Libs-Samplers
Turtle Beach Software
SampleVision
MIDI Interfaces
Roland
MPU-IPC, MPU-IMC,
LA PC-1, SCC1
Voyetra
V-22m, 24SM
Music Quest
PC MIDI Card
MQX-32M

ATARI ST

Sequencers
Dr. T's
Omega
Tiger Cub
Midisoft
Midisoft Studio
Passport Designs
Master Tracks Pro
Master Tracks Jr.
C-Lab
Creator
Steinberg/Jones
Cubit
Pro-24 III
Twelve
Integated Sequencing and Printing
C-Lab
Notator

Scoring & Printing
Dr. T's
Copyist Appr,DTP
Hybrid Arts
EZ-Score Plus
Steinberg/Jones
Masterscore
Interactive
Dr. T's
M
Editor/Libs Samplers
Digidesign
Softsynth
Sound Desiger
Dr. T's
Samplemaker

Take Note Software
Take Note

AMIGA

Sequencers
Dr. T's
Tiger CUB
KCS w/Level II
TakeNote
Scoring and Printing
Dr. T's
Copyist Appr.or DTP
Interactive
Dr. T's
Copyist Appr or DTP
Interactive
Dr. T's
M, X-or Editor Libr.
Bars & Pipes Pro
Pixound
APPLE II/IIe
COMMODORE 64/128
PowerStation C64 /128
GlassTracks II+, IIe, C64
SuperSequencer IIe,C64
Dr. T's
KCS, IIe, C64/128

* See Chapters 2 and 5 for additional software listings.

MUSIC EDUCATION SOFTWARE & RESOURCES

Today, there are hundreds of titles of music education software that are available for most computers. In fact, music software has grown to the point where the publisher of this guide highly recommends you to call or write to the following manufactures and obtain their current product catalog that includes software descriptions and prices.

Much of the MIDI-based educational music software can be classified as CAI (Computer Assisted Instruction) and interactive; it ranges from basic theory, sight reading, tutoring programs, and elementary composing programs to instrument finger training and training/teaching of musical concepts through a MIDI instrument or by using a stand-alone computer, monitor and the computer keyboard. Usually it is more advantageous to use a computer, a MIDI interface, a MIDI-equipped keyboard, and selected music education software. This way the user is involved with hands-on practice and stays actively involved in the lesson and development. Just answering questions on a computer screen or listening to the small internal speaker of the computer may not be as motivating.

Here are several examples of interactive music education software with MIDI options:

The Miracle Piano Teaching System is a complete A-Z package that teaches you to play the keyboard and is available in these formats: Macintosh, IBM/compatibles, and Nintindo. This system includes a low-end MIDI-equipped keyboard (touch sensitive) and excellent software that will take a beginner through an in depth course with structured lessons custom designed for that level and ability. The Software Toolworks.

Electronic Courseware Systems has a complete line of ear training, note naming, sight reading, skill building MIDI and nonMIDI music education software available. The prices generally range form $39 to $199 for complete course packages. Many times a software demo disk is also available for a small deposit with a return policy. ECS.

Jazz Through MIDI. Learn jazz improvisation with a MIDI sequencer. An original approach can be used by any player at all levels of ability, includes 60 professional arranged solos with rhythms accompaniment of bass, piano, and drums.

Compose Yourself. Interactive Learning Software. Complete "How To" Composing Package for the Macintosh. Package includes 8-track sequencer, chord computer, composer strategies HyperCard Stack. MacBeat.

Practica Musica. Music software that teaches the user music in a format designed especially for variety and user interaction within its learning structure. Goals of the software include read and write music with activities covering pitch, reading, scales, intervals, chords, rhythm and melody. Ear training activities include full melodic dictation and four-note chords, beginning with simple triads and moving through seventh chords in inversion. Ars Nova.

Listen. This music education software teaches the user how to identify the basic building blocks of music. Listen teaches how to recognize intervals, melodies, and chords when you hear them in key. Exercises range from beginner to advanced lessons and allows the user to work at one's own pace. The software covers triads, sevenths, ninth, eleventh and thirteenth chords and their inversions plus melodic sequences of increasing lengths. Imaja.

Adventures In Musicland. A unique collection of musical games specially created for children of all ages and abilities to be used on a Macintosh. As they play their understanding of sounds, musical tones, composers, and even musical symbols will

be developed. The four games include: Music Match, Sound Concentration, Melody Mixup, and Picture Perfect. Dr. T's.

MiBac Music Lessons. This software provides drills for mastering the following musical skill: Note Names, Circle of Fifths, key Signatures, Major/ Minor Scales, Modes, Jazz Scales, Scale Degrees, Intervals, Note/Rest Durations, Ear Training, Intervals, Ear Training Scales. MiBac.

TakeNote. MIDI Ear/Sight Training for musicians. Recognition drills for pitch, intervals, chords, arpeggios, scales, note spelling on the staff. TakeNote Co.

Fast Fingers MIDI Keyboard Lessons. Music education lessons in three titles. Each featuring specific skills and drills, i.e., Minor scales, Arpeggios and triads, jazz modes other music drills and finger training lessons. Fastfingers Co.

PianoWorks. Piano instruction software system for the IBM/compatibles packed
with powerful computer assisted instructional activities that range from rhythm
exercises, music reading, and fingering to student report printing, playing chords
and on-screen help. Temporal Acuity Products.

The following companies are excellent resources for music education software products. The music education software industry has complete product lines with specific targets for learning, drilling, practicing, and developing music theory and skills. Your specific goal can be reached with a comprehensive package.

ALFRED PUBLISHING CO., INC. 16380 Roscoe Blvd., PO Box 10003, Van Nuys, CA 91410-0003; tel. (818) 891-5999.

ARS NOVA. P. O. Box 637, Kirkland, WA 98083; tel. (800) 445-4866 or (206) 889-0927.

BAUDVILLE. 5380 52nd St. SE, Grand Rapids, MI 49508-9765; tel. (616) 698-0888.

BRITANNICA SOFTWARE. 345 4th St., San Francisco, CA 94107; tel. (800) 572-2272 or (415) 597-5555.

CODA MUSIC SOFTWARE. 1401 East 79th St., Minneapolis, MN 55425; tel. (612) 854-1288.

COMPUTERS AND ME, LTD. 10 Ashbrood Rd., Exeter, NH 03833; tel. (603) 772-8850.

CONDUIT. P. O. Box 388, Iowa City, IA 52242; tel. (319) 335-4100.

CTM DEVELOPMENT. 1013 South Clarmont St., Suite #1, San Mateo, CA 94402; tel. (415) 573-8945.

EDUSOFT. P. O. Box 2560, Berkeley, CA 94702; tel. (800) EDU-SOFT or (415) 548-2304.

ELECTRONIC COURSEWARE SYSTEMS, INC. (ECS). 1210 Lancaster Dr., Champaign, IL 61821; tel. (217) 359-7099.

FAST FINGERS MIDI KEYBOARD LESSONS. Box 741, Rockville Centre, NY 11571; tel. (800) 327-0209.

IBIS SOFTWARE. 90 New Montgomery St., Suite 820, San Francisco, CA 94105; tel. (415) 546-1917.

IMAJA. P.O. Box 6386, Albany, CA 94706; tel. (510) 526-4621.

MACBEAT. (800) MacBeat or (505) 988-1710.

MAESTRO MUSIC. 2403 San Mateo NE, Suite P-12, Albuquerque, NM 87110; tel. (505) 881-9181.

MECC. 3490 Lexington Ave. N., St. Paul, MN 55126; tel. (800) 228-3504 or (612) 481-3500, extension 527.

MIBAC MUSIC SOFTWARE, INC. P.O. Box 468, Northfield, MN 55057. Call 507-645-5851.

MIDIMOUSE MUSIC. Box 877, Welches, OR 97067; tel. (503) 622-4034.

NOTABLE SOFTWARE. P. O. Box 1166, Dept.. EM, Philadelphia, PA 19105; tel. (215) 736-8355.

PYWARE/PYGRAHICS. PO Box 639, Grapevine, TX 76501; tel. (817) 481-7536.

SOUND MANAGEMENT, ***ELECTRONIC MUSIC PRODUCTS***. P.O. Box 3053, Peabody, MA 01961. Extensive line of any music educational software; tel. 800-548-4907; Fax. 508-532-6106.

TAKE NOTE SOFTWARE. 285 Divisadero, #3, San Francisco, CA 94117; tel. (414)-431-9495.

TRIMBELLE MUSIC SOFTWARE. GS and Mac music software series. W 8215 760th Avenue, River Falls, WI 54022, tel. (715) 425-6438.

TEMPORAL ACUITY PRODUCTS, INC. (TAP). 300-120th N.E., Bldg. 1, Bellevue, WA 98005; tel. (800)-426-2673 or (206) 462-1007.

THE SOFTWARE TOOLWORKS. 60 Leveroni Court, Novato, CA 94949; tel. (415) 883-3000. Miracle Piano Teaching System.

Pyware's MusicWriter Notation Software, Apple IIGS, MIDI Interface with a MIDI keyboard.

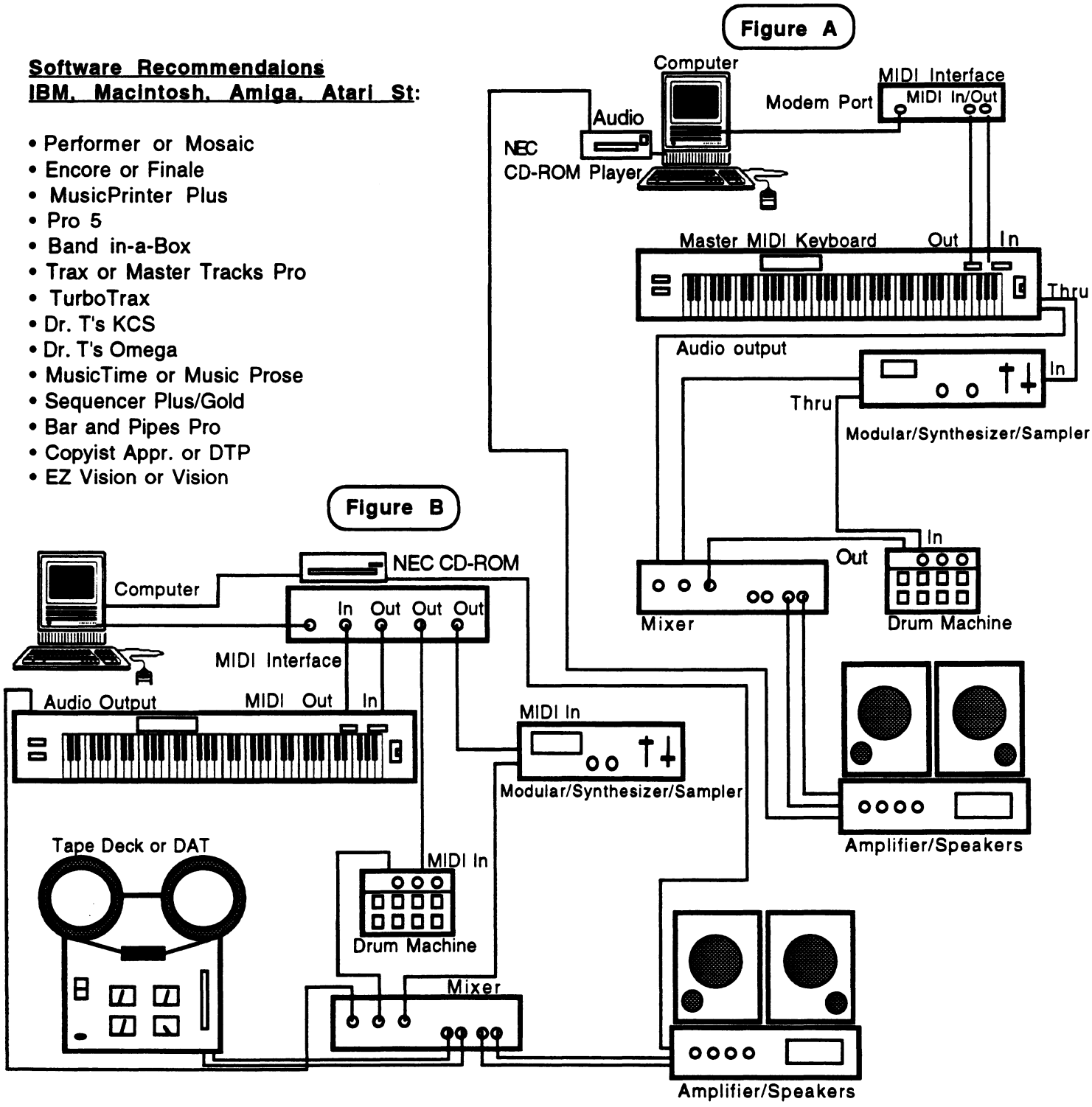
Chapter Three: MIDI Configurations

Computer-Music Workstations + CD-ROM
Pro Music Workstation
Complete Apple IIGS/MIDI Configuration
Song Writer's Computer-Notation-Printing Workstation

Computer-Music Workstations + CD-ROM Multimedia

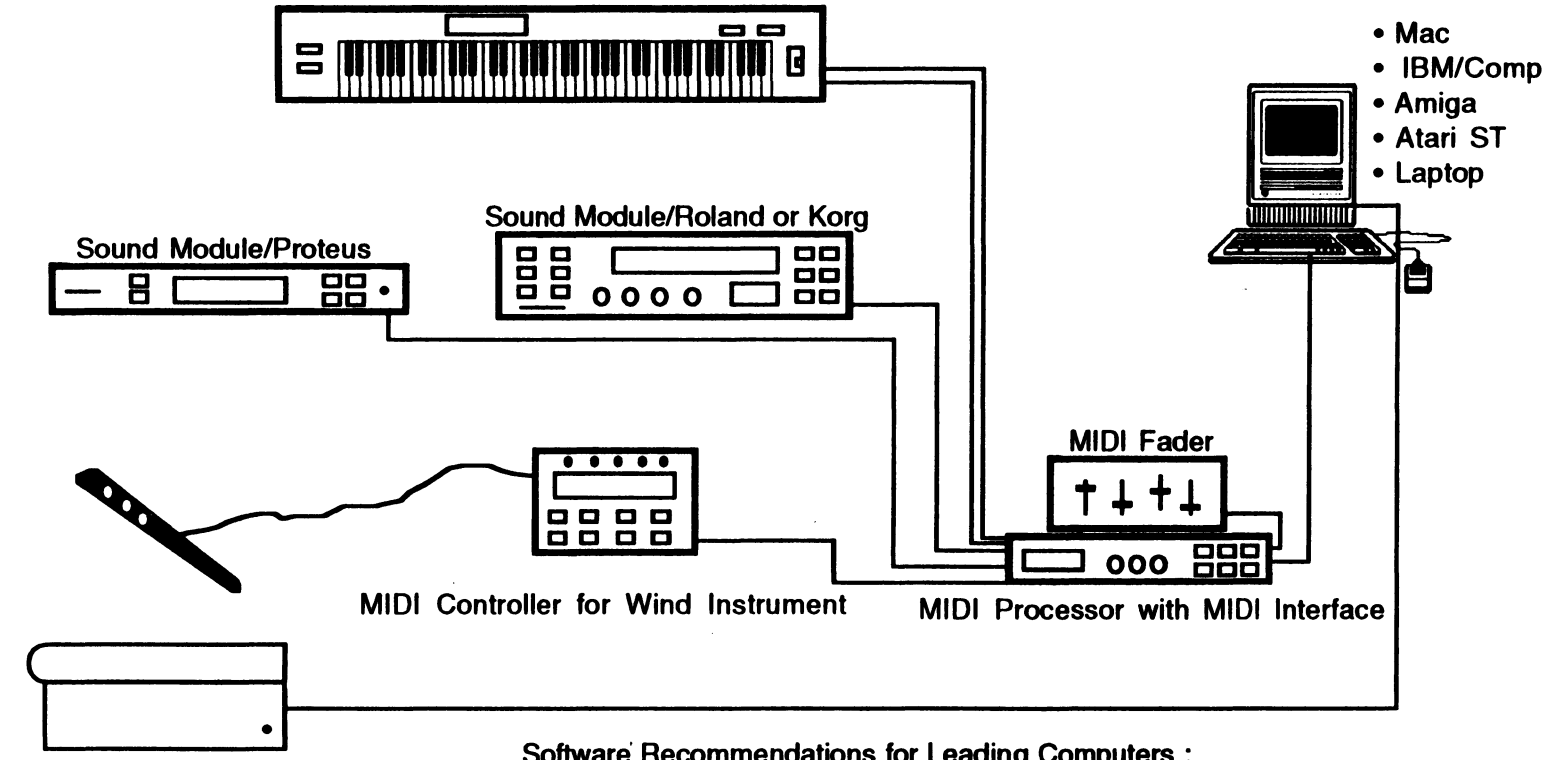
Software Recommendaions
IBM, Macintosh, Amiga, Atari St:

- Performer or Mosaic
- Encore or Finale
- MusicPrinter Plus
- Pro 5
- Band in-a-Box
- Trax or Master Tracks Pro
- TurboTrax
- Dr. T's KCS
- Dr. T's Omega
- MusicTime or Music Prose
- Sequencer Plus/Gold
- Bar and Pipes Pro
- Copyist Appr. or DTP
- EZ Vision or Vision



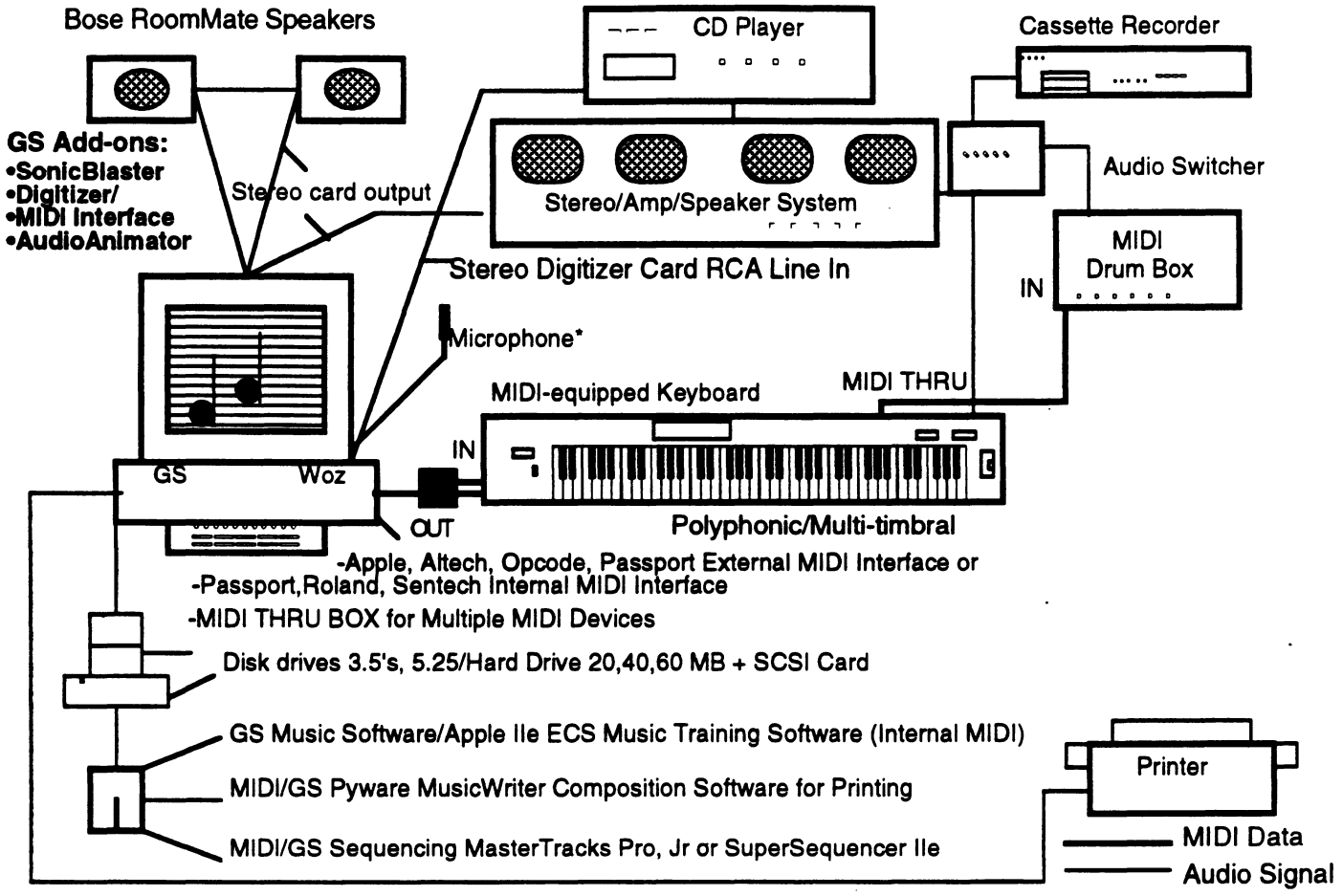
Computer-Sequencer/Notation Software-Based MIDI Workstations + CD-ROM for Multimedia.

MIDI Wind Instrument, Sound Modules, Master Keyboard, Computer, MIDI Processor/Interface--Pro Music WorkStation



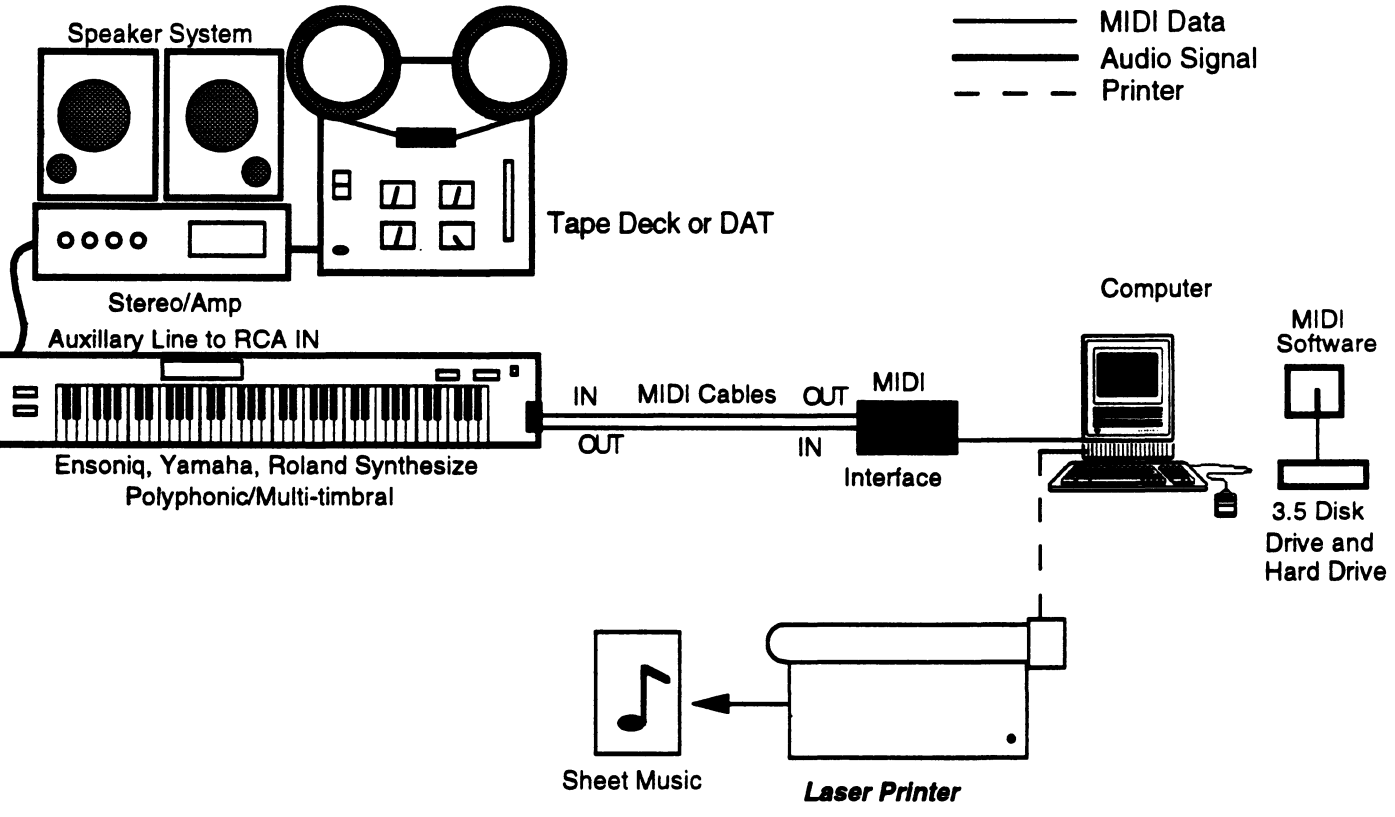
Software Recommendations for Leading Computers :

- Passport MasterTracks Pro+ Encore, MusicTime-IBM/Mac
- Opcode Vision or EZ Vision or Studio Vision-Mac
- Dr T's Omega, TigerCub, Copyist DTP-Atari ST/Amiga
- TwelveTone Cakewalk Pro/Windows-IBM
- Temporal Accuity MusicPrinter Plsu-IBM
- Coda's Finale or MusicProse-IBM/ Mac
- Mark of the Unicorn: Performer, Composer, Mosaic-Mac
- Blue Ribbon Bars and Pipes Pro-Amiga
- Cubase-Atari St/Mac



The Complete Apple IIGS/MIDI Configuration

- Musical electronic system for education or home.
- MIDI workstation with multi-timbral instrument and MIDI drum box.
- Digitize sound--using add-ons + a microphone, CD, MIDI keyboard, or drum box.
- Stereo output for GS musical software with use of external speakers.
- Use of MIDI software for notation/composition and music printing.
- MIDI + GS/IIe CAI music education interactive training software packages.
- MIDI output through stereo/amp. and speaker system.
- Management of custom sound files for GS software and MIDI instruments.
- Add-on potential for audio and multimedia applications.
- Sequencing software for multi-track recording of MIDI instruments.



Song Writer's Computer-Notation-Printing Workstation

- Computer with 2-8 MB of Ram and hard drive
- Laser pinter or ink jet printer.
- Notation software: Finale, Encore, MusicPrinter Plus, Mosaic, MusicTime, MusicProse, other.
- MIDI interface: Apple, Altech, Opcode, Passport, Sentech, CMS, MusicQuest, other.
- Korg, Kawai,Yamaha, Ensoniq, Roland MIDI keyboard.

Chapter Four:
An Introduction
To Using The Apple IIGS
For Sequencing With
Passport Design's MasterTracks Pro™
&
For Music Notation With
Pyware's MusicWriter™

By Henry W. Peters

© August, 1992

An Introduction To Using The Apple IIGS For Sequencing With Passport Design's MasterTracks Pro™ and For Music Notation With Pyware's MusicWriter™

By Henry W. Peters © August, 1992

Introduction

This chapter will serve as an introduction to composing and producing music on your Apple IIgs computer. If you are using some other programs other than Passport Designs or Pyware programs, you will still find some similarities of sequencing and developing music notation, but of course, you should refer to your program instruction manuals for proper direction on specific functions. In addition, this reference material this will offer some general and useful information about sequencing and home publishing of music on your computer; the software orientation and procedures for your music and its directions.

The idea is to put you in the driver's seat, and in the presence of a means to begin to realize your aspirations in music using your computer and software. You will begin to develop a hands-on feel for these electronic tools . . . to enable expre ssion using sound and sense for whatever purposes your vision and imagination are capable of creating.

If you have a working knowledge of your Apple IIgs and want to move ahead, you can skip this section and go on to loading and using your program/s; "What You Will Need," where we will get right down to basics. You will find that patience, perseverance, perspicacity and determination will be very helpful along the demanding road to accomplishment, as well as resisting the temptation to panic or to give up in the face of uncertainty. *Good music to you!.*

Basic Facts About Your CPU

An Apple IIgs is an evolutionary step in the Apple II line of computers. The gs uses a 65816 microprocessor chip that is basically the heart of its central operations (hence the term; central processing unit or CPU). The 65816 chip is capable of emulating the earlier Apple II family of computers, but run in its native mode is 16 bits wide, whereas the earlier chips were only 8 bits wide (like roads to carry electronic signals that are necessary to perform the tasks assigned by the various controlling devices), hence the term *ProDos 8*. This feature allows the Apple IIgs to run the earlier Apple II programs.

The "gs" in Apple IIgs stands for Graphics and Sound. In other words, this machine has internal capabilities in this direction via a high res (resolution) large scale integrated (LSI) video chip called the *Video Graphics Controller*, or VGC. The VGC can generate 4,096 colors on the screen with two basic modes; low res, or 330 mode; high res or 640 mode. These mode numbers refer to the resolution of image or number of tiny dots or bits of light (pixels; 2 bits wide: 4 bits high) across the monitor screen. For sound, a fifteen track Ensoniq sound chip called the Digital Oscillator Chip or D.O.C. is used. It has 64k (kilobytes) of independent RAM (random access memory) and can generate waveforms or electronic images of voices from digital samples stored on a disk and loaded into its memory. What this means is that the Apple IIgs is capable of producing multi-

voiced sounds for music and still function as a computer. But sounds are not limited to internal waves, so the possibilities in terms of quantity or quality do not stop with the IIgs' CPU and its own various memory capacities, which are up to 8 megabytes (MB). The degree that you will use these internal capabilities will depend on a number of factors, not least of which will be; where you are in learning the basics of whatever aspect of music that interests you. While the Apple IIgs is probably not the ultimate in sophistication, as far as computers in music are concerned, it is, however, a formidable tool for these and other uses from beginning stages of learning to producing hits that may be transmitted through the eons of human history! The more you learn, the greater the possibility to become master of the machine which has many implications.

Computers used for music are not necessarily computer music. This is a distinction worth beginning to think about. There are some people who still use the Apple II family of computers for its programming capabilities and in the field of music. However, the two programs highlighted in this chapter are designed mostly to accommodate the production and arrangement of musical approach and grammar, rhythm, melody, harmony and dynamics, as we have become generally accustomed to (i.e., "classical European", "folk" music, "rock 'n roll", "jazz", "blues", "country western", etc.). And indeed, in learning, don't be afraid to find material that is familiar to work with, especially when you are not so familiar with the various controls for the computer or synthesizer or the instruments you are using. A computer is supposed to be an aide to your music work, not the other way around, i.e., a hindrance. But as you develop your technical hands on skills, you will find that you will be trying out some different approaches, to sound, to production and, as the saying goes, one thing can lead to another. Also, on the esthetic side, remembering that keeping one's interest alive may help keep any potential audience from falling asleep. Or conversely, keeping you alert to what you otherwise, exactly didn't want to do.

Clicking Buttons and Mice, At last

What You Will Need:

- Apple IIgs with a 3.5" disk drive.
- One Meg of RAM memory installed.
- Mastertracks Pro™.
- MIDI-equipped keyboard or MIDI tone generator.
- MIDI interface with appropriate cables.

What Is Strongly Recommended

- Two 3.5" disk drives with plenty of preformatted disks (1-10) or a hard drive (internal or external). With only one disk drive, there will be excessive disk swapping. See your System *Manual* for details on formatting disks properly.
- A MIDI keyboard controller and or synthesizer(s). Any configuration you are able to afford and or want to figure out.
- At least 1.25 Meg of ram (the author finds 2 Meg to be adequate for starters.
- An accelerator card.
- System GS/OS (up to v. 5.02).

Please note the following about Mastertracks Pro™ with operating system 5.02. It basically works fine with this version of operating system, however, you must *not* try to open the control panel through the menu **Apple** or this program will lock up, freeze and *you will lose any data* that you have produced. If this happens, you can simply re-boot (that is, restart your computer and open up the program). Passport designs has stopped upgrading the Apple IIgs version of their Mastertracks program at version 1.04. The program version being reviewed is v. 1.0. Apple has, at this date, released with GS/OS, v. 6.0 but v.5.02 is the operating system being used in this reference material. Mastertracks Pro™ is a very usable program, and some small inconveniences are a small price to pay for the possibilities it allows with the Apple IIgs. Yet, it would be nice if the good folks at Passport Designs followed through with their update program; unfortunately, MasterTracks Pro has actually been discontinued for the IIgs. You may still find some copies available through software dealers or Master Tracks, Jr. which is similar to the Pro version but has fewer features.

Some other notes regarding hardware; without an accelerator card, your monitor may not follow the music while playing back. The Transwarp accelerator by Applied Engineering works fine and approximately doubles the speed of the Apple IIgs. And, with to small memory (RAM), the size of your music files may (will) be limited.

Some Words About Operating Your Computer
Because many of the people who write programs for Apple Computers follow the *Apple Guidelines for Human Interface*, many Apple IIgs programs will have similar commands and shortcuts (macros or combination key pressed, i.e.; **Command-Control-Escape,** will accesses your classic desk accessories (CDA) and will be similar to the commands and conceptions as MasterTracks Pro™ and Music Writer™. You will possibly find that it will be helpful to study and use word processors, spread sheet, and database programs so that you can become acquainted, in pure principle, with the operational commands and user functions of your computer.

Hardware and Software Connection
You need to connect all external peripherals before you boot-up any hardware. This would be your external MIDI interface, MIDI cables to your MIDI device/s, i.e. keyboard, tone generator/s, drum machine/s etc. The single cable from your MIDI interface to the CPU has an eight pin DIN connectors on each end. Plug one end to your CPU, using either the printer port or the modem port. The printer port is, looking toward the front from the rear of the CPU, the second din port on the left side (See Figure 1) and the modem port is the first. Take the other end of the eight pin din and plug that into the MIDI interface. From the MIDI interface, you connect the MIDI OUT to the MIDI IN of your MIDI device, and the MIDI OUT of your device to the MIDI IN on your MIDI interface. This simple connection uses standard cables that are five pin din MIDI connectors.
(See Figures 1 and 2)

You now should boot-up your computer. Go to the control panel and click open the slots to properly configure your CPU to connect with whichever port you will be using for you MIDI interface, i.e., slot #1 (printer) should read "Printer" or if you use the modem port it should read "Modem". Click the control panel closed and you will have to restart your computer to have the desired configuration take effect.

Installing Master Tracks Pro™ On Your Hard Disk
To put MTPro on your hard disk (HD) is a simple task. You put the back up disk into your disk drive, double click the MTPro Icon, drag the program icon onto your HD icon so that it is copied there. Go to the MTPro disk and open the Icons folder and drag the Master Tracks Pro icon into the Icons folder to your hard drive. You are ready to open your program and get to work. You have MasterTracks Pro™ installed and, now, you are ready to use a powerful digital to digital multitrack tape recorder.

Turn on your keyboard and amplifier and equipment you will be using to sequence.
By the way, if you are not using a hard drive, have plenty of preformatted disks ready in order to save any work you wish to save. Boot your computer, if you have Macro Mate or any kind of screen saver installed you will have to turn them off and then double click the MasterTracks Pro icon.

A Pause
Right about now seems like a good time to stop for a breath and pause from the electrical-technical side and contemplate for a moment on a reminder-so that you will remember to look for your way home, to your roots in music, as you allow the various discoveries in digitizing sounds to excite and possibly even extend your current musical abilities and insights. With that in mind, a word of caution here extends. You will not find a sense of judgment with your computer, and you will not find a sympathetic ear nor an unsympathetic ear. There is no substitute for experience, and ability is drawn out from within, to without. The computer simply reflects what it gets, albeit in sometimes, heretofore, unexpected ways. . .

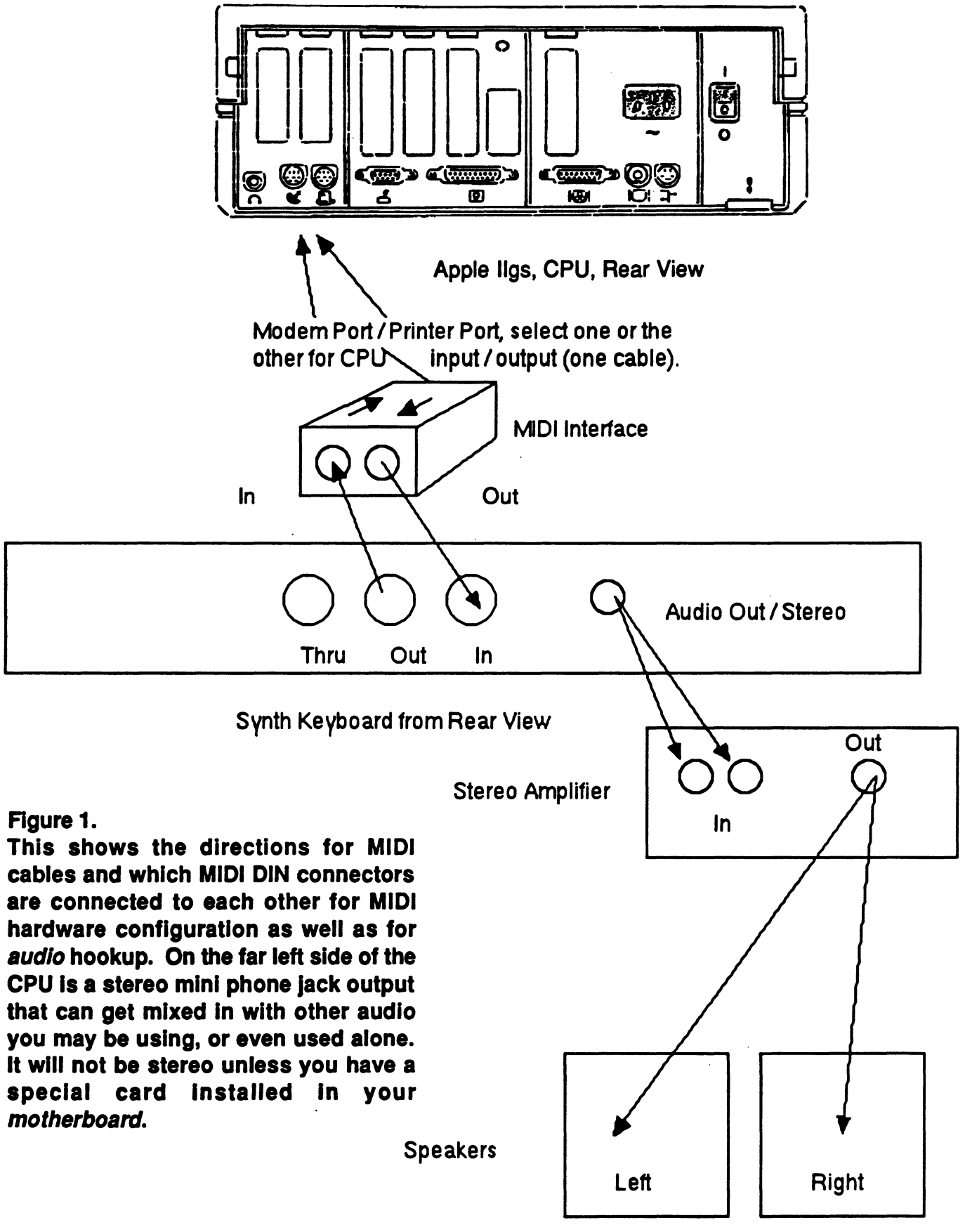


Figure 1.
This shows the directions for MIDI cables and which MIDI DIN connectors are connected to each other for MIDI hardware configuration as well as for *audio* hookup. On the far left side of the CPU is a stereo mini phone jack output that can get mixed in with other audio you may be using, or even used alone. It will not be stereo unless you have a special card installed in your *motherboard*.

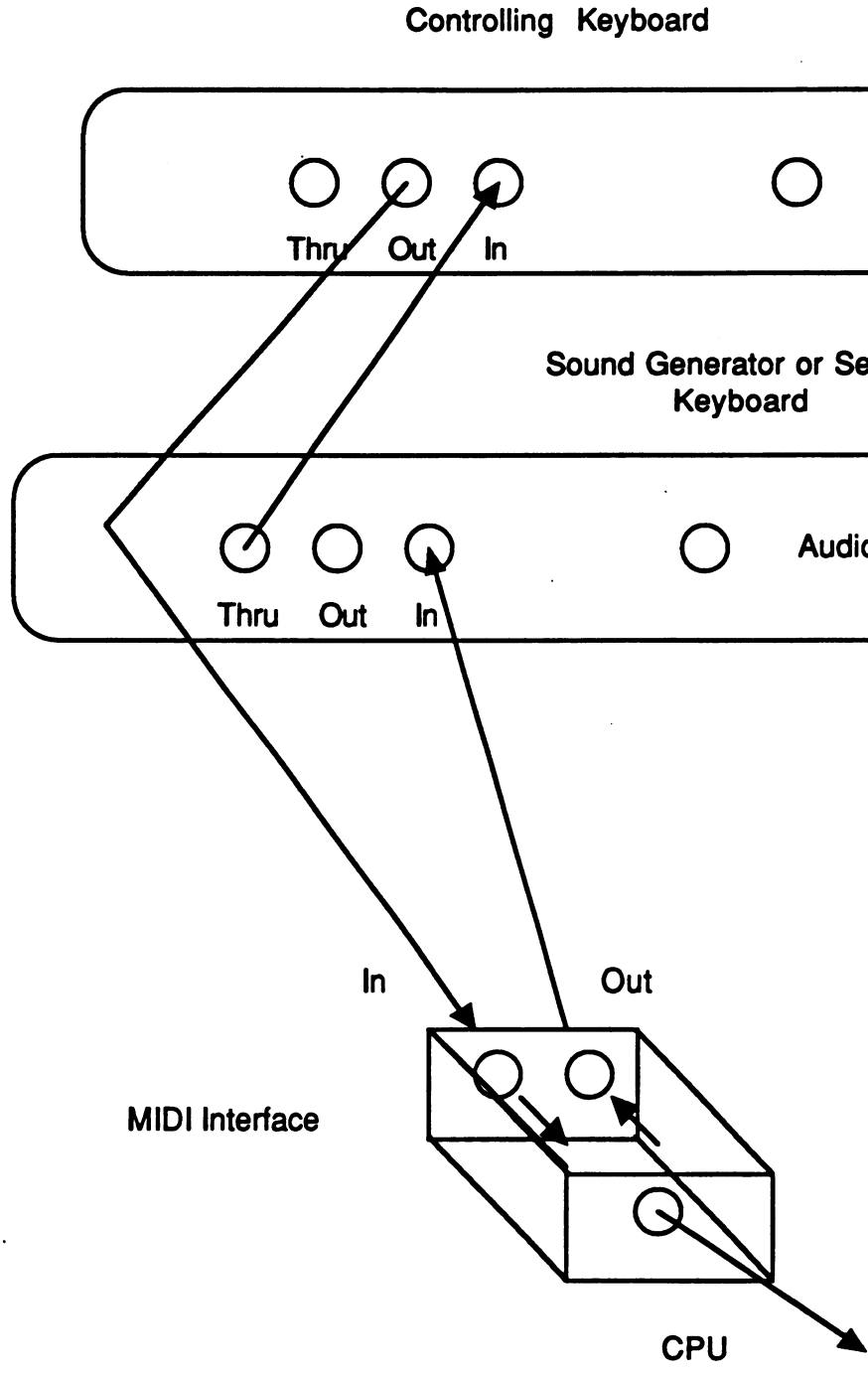


Figure 2.

If you have more than one MIDI device, you need, at minimum, to use the MIDI thru connection. It is really the equivilant of an OUT. If you are using Master Tracks Pro, you will also need to go to the controlling keyboard and turn your LOCAL TALK *off.* You will also need to go to the lower right hand side of your MTPro screen, the Transport and click on the Thru field. Make sure the MIDI channel selected in your synth corresponds with the channel in MTPro..... and it should be turnd *off* in your controlling keyboard, but ON in the second device.

Up and At It

You should now see the following windows in your computer screen: a menu bar (across the top), the **Track Sheet** (underneath the menu bar, on the left), the **Song Editor** (to the right of the track sheet), the **Conductor** (below the **Track Sheet** and on the left side) and a Tape Transport window (this will be called **untitled** when you first open a new sequence); this *very* important feature of MTPro is the long window on the bottom and to the right of the conductor.
(See Figure 3)

Look in the Track Sheet and you will see a column heading called "**Rec**" (for record) and below this you should see a round red ball. This ball indicates which track is the recording track. Click this and the ball will disappear; click it again and it will reappear. If you want to record using different channels, you should click on the whatever row you are using, the sixth column where it says "Chnl" and a pop-up window will appear, type in the channel number you intend to use (assuming you have your sequencer output going

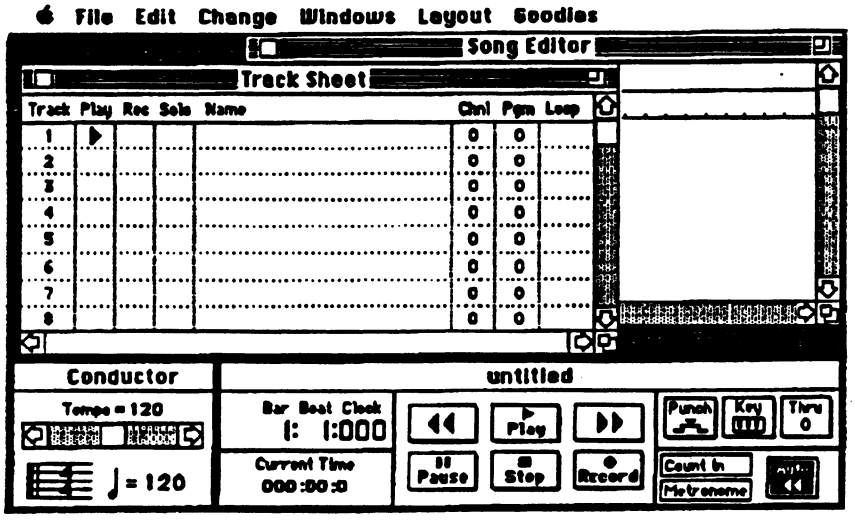


Figure 3.
Master Tracks Pro when you first open up the program. The bottom right portion next to the Conductor Window is called the "Transport" because of the similarity to a transport used to control a conventional tape recorder.

The tape transport window is an analog or image of an actual mechanism which is used to control a tape recorder. This helps us to be able to have an immediate feel for what we are doing. Within this window, you should notice on the lower right side a small window that says "Auto," (auto-return). The function when highlighted or darkened, actually is the sequencer, when stopped, it will return to the place where it was started from. This will enable you to either playback what you have recorded or to edit or to record another track, etc. Leave it on for now, or click it on if you are the adventurous one and experimented with the windows, just to see first hand.

to that channel), we will say one, for example sake. But in fact, if this is a bit beyond you for now, don't worry, leave "Chnl" on 0 and MTPro will receive and playback whatever channel you transmit to it.

Now Recording

Click on the **Song Editor** window, and you will see the vertical gray bar (the end of the recording indicator) next to the numbers of the tracks (*not channels*). Now either press **return** on you computer keyboard or click on **Record** in the transport window with your mouse, and play some sequence of sounds from your keyboard, tone

generator. You will be able to monitor the bar, the beat, the clock as well as the current timing by looking at the left hand portion of the tape transport window. *MTPro does not overdub;* so if your first efforts seem too unsatisfactory, you can just start right over again, re-record over the same track. Click Stop with your mouse on the transport or just tap the space bar on your computer keyboard. OK, now you have a few bars, we'll say four. Now, let's try recording ano*ther* track. One that will play simultaneously with the first one.

First, click on the **Track Sheet** and put the **red record ball** into the *next track down.* This would be 2, assuming that you just recorded into 1. Then click on the **Song Editor** window, press **Record** and play your accompaniment to what you previously recorded. The first track will playback even as you record. You now, perhaps, begin to see the possibilities, as your computer demonstrates the ability to playback and record your sounds *simultaneously.* This is just the beginning!
Next, we will try to give you an outline of sound editing and arranging features. We will explore this by starting from the left-side menu, window by window, and then save a file.

A General Review of MasterTracks Pro: The Main Windows

The first thing you might explore is the **Apple** Icon. If you are running any system beyond GS/OS 4, the only usable feature here will be "*About Master Tracks Pro™*"". As previously stated, the Control Panel and any other New Desk Accessory will lock MTPro and cause a system crash. You will have to restart using **command-control-restart**, but it could be useful information to learn what version of MTPro you are running.

Track Sheet

Once you have recorded some thing, you will see a triangle block in the **Play** column. If you click on the triangle you will see it in outline form. This indicates that this track is turned off. However, the data is still there but does not play until you click it back on. This feature is very useful in situations where you want to try another version of a track, or need to get away from the sounds you have produced in this track, or if you are using tracks for storing or as note pads for various reasons.

We have already discussed the Rec button and next is the **Solo** button. If you have any number of tracks recorded and you only want to hear one, click the solo area on the desired track and you will see a black diamond appear. This means that the only track you will hear will be the one selected. Next is the **Name** column which when clicked once, brings a small pop-up window which allows you to name your track or put some note type in it, (no special path name format is necessary here, just as many letters and spaces that will fit into the window) and click on return.

Next is the Chnl column. This allows you to match the channel of the recorded track to both the output and input of the channel on your MIDI device/s. As so many other features may seem a bit confusing at first, do not hesitate to experiment. Try different settings here; see what you get, different channels, that is, different voices playing the same track of data, this vast musical implications. What sounds one way on one instrument or voice, may sound very different on another. You should not forget this. If you want to think of yourself as developing and using the fullest potential of synthesizing music; the sounds of the voice making music, is your basic material for this craft.

Pgm, or program, you wish to start out with will be another feature which can be of use. This is something you can and should explore, at a later time, leave it as it is, or monkey around as you please.

Another very helpful feature in music sequencing is the ability to do loops. This is probably, at least, a double edge sword. That is, one should probably learn the drawbacks and difficulties doing loops both by experimenting boldly as well as giving as much forethought and planning as one is able. In other words, *most concepts in repetition in the past were based upon the ability of the musician to sustain the repetition, a physical as well as mental limitation.* That being said, we will leave the rest for you to figure out and give meaning for

yourself. Except to say, that to execute a loop in MTPro, all you have to do is single click on the loop column and a **u** shaped arrow will appear and whatever you have in that track will, when it reaches the end of the recorded track, go back to the beginning, as long as you start your music somewhere where that track is playing. . . have fun!

With Master Tracks Pro™, there are a potential of sixty-four channels, capable of playing back simultaneously. You access them by scrolling on the scroll bar on the right-hand side of the **Track Sheet.** Unless you have a lot of voices (notes on voice generators) available, you will probably not need all of those channels; but they are there, waiting for your commands.

Song Editor

At first glance, the song editor window may seem a rather uninteresting feature of music sequencing. The appearance given indicates that there is data recorded in whole measures, or not. That is to say, the tracks show empty blocks or filled blocks or no blocks, but appearances can be deceiving. An example: Think about the music you just recorded. If you wanted to, say, have it play in a key that was a half step higher or lower and what you would have to do to get this there as either some part of it (say a measure) or the whole recorded part. With MTPro, in the Song Editor window, you simply select in blocks of measures with the mouse and cursor (for individual notes there is another route, to be discussed soon). Go to the Transpose item in the **Change** menu, let it go, and you get a small pop-up window that says **Transpose** on top.

You As Conductor

At the bottom left of your screen, you will find a small window that says **Conductor** at the top. This will be and should be a endless source of amazement to you. First, as with all windows on the screen, you click on it once to activate it. Then, either while playing back or not, you click on the scroll arrows to increment or decrement the tempo, or in the scroll bar for a larger change to your record/playback tempo. So stop and notice, when you do change the tempo, *the pitch of your music does not change!* This is a near miracle of digital recording. When you click on the stave which has the meter numbers on it, you get the **Change Conductor** window. This allows you to change the meter, beat, tempo by some various increments. You can sharpen up your conducting skills with this item, plus, check out the **Conductor Edit** in the **Windows** menu. This allows you to prepare in advance a sort of map of meters and tempos, as well as the capability to change these aspects of your music after it has been recorded. You will need to learn to keep control over what you are doing, though. The computer can't straighten out a muddled meter without your help! A sense of what you want, as always, is indispensable. These are choices to be made and lived with here.

A Brief Interlude For Selection Methods In The Song Editor

This is a good place to stop for a short discussion on some of the various ways of selection in **Song Editor** window: To select whole track/s at a time, with your mouse click on the track number bar next to the track or tracks you wish to select; To all tracks of certain bars, click above on the bar number area and drag until desired selection is complete. You can insert the cursor click and drag either forwards or backwards. You can select a starting bar and hold down the shift key, and click at the last bar you want selected, again, either backwards or forward. And, you can select all either from the keyboard command-A or the Select All item in the Edit menu much as in a word processor.

You may find that sometimes the selection is retained in appearance often in rather quirky highlighting and this, even though you have clicked the cursor some place to remove the selection. What you need to do to refresh the screen (redraw) is to click on the size button on the upper right corner of the Editor window, and then you can click it again if you don't want the larger area window. You will find this helpful when you are in other windows as well.

Back To Transposition and Editing

Open up the **Change** menu, drag down to **Transpose**, release the mouse, and a small pop-up window will appear. You then have the option to either enter the desired changes by typing them in. You can use the tab key on your keyboard to change "Transpose" notes from... to...and, you will find that this is true of many other data entry windows as well; you can, by clicking on the arrow icons towards the desired intervals of transposition, and then click **OK** when you think it is the desired change or, as with many other situations. You can back out of any change by clicking on **Cancel.** So try it, and then playback after, to check out the results, and if you do not want this, you can use the undo command from the Edit menu or command-Z from the keyboard as long as you have made no other changes. MasterTracks Pro™ forces you to work in orderly ways, keeping some notes on what you are trying to do is probably not a bad idea, especially when trying new or complex ideas out to avoid unnecessary confusion such as forgetting what key you just transposed from. You could also Save your work and then use the Revert to Saved in the File menu if need be. Some times it may be better to just start over again; you might be surprised how you find out how your own memory can tell the significance of your music.

Some Common Features

There are some features which MTPro uses in common through the menu area, that is, that you can access from any window for use, these are: All of the items in the **File** menu, all of the items in the **Edit** menu except **Mix Data** (dimmed unless there is data in the clipboard), you can access any of the windows from that menu. In the **Layout** menu, the **Follow Playback** when check marked (**Do Not Follow** when not check marked) item is available, and, by the way, this means that you can have MTPro do just what this says; follow your playback or not. All of the items in the **Goodies** menu are available, and worth exploring, as you get more familiar with the basics of sequencing. You will quite likely find the *necessity* to be able to accommodate for different recording or play back scenarios, taking advantage of being able to control MTPro with an synthesizer keyboard.

Now when you d*ouble click* at a particular bar in the **Song Editor** window you will see appear, starting at that spot, a new window that you will be getting very familiar with. At first glance you may think that you have gotten a *player piano,* as this is the basic concept with the **Step Edit** Window. Probably the best, first thing to do here is to resize this window to cover the whole of the screen by clicking in the resize box in the upper right corner. The window should now be expanded. If for some reason it doesn't, do it by dragging from the bottom (right hand side) grow box. You might have to use the bar that has the title Step Edit to move the window around. This, too, is a rather generic feature in MTPro. You can pretty much tailor the various windows around to suit your needs, very handy. The layout that MTPro comes with, rather resembles a tape recorder and seems familiar, and appropriately ordered, and the general placement of the work fields is a good starting point. But, you can save some of your preferences once you set the windows to your needs.

The Step Editor

Opening this window has made available some more ways to enter and edit music into the Apple IIgs MIDI functions. And although you can use your synthesizer keyboard, as you did in the case of our first example, you can step enter in either one of two ways, and that being done (or utilizing the music we, in the example, have already entered) can use the single note edit, or select groups of notes between bars to be edited. In the **Step Editor**, with the pointer, try double clicking on a single note (various sized blocks—these are the rectangular shapes arranged in grid like fashion, indicating notes) and you will see a small pop-up window appear with sub-windows for data entry of which you can use your mouse or CPU keyboard to enter changes in data.

It would, also, be instructive to study what each of those sub-window data represents, as these are

basic aspects of sound in your sequencer, as to develop the ability to control this data in a desired manner. The start *time*; where the note start, the *key;* or pitch, the *velocity* on and off, or loudness or softness, which can effect the timbre or the sound, the *duration* or how long the pitch endures from the start time, and you can place this note in another channel with the **Channel** window. You will see some arrows pointing "up" and "down," these allow you to use your mouse to change whatever data window is selected. But, you can use your CPU keyboard to type in a value as well. When it is the way you want, click OK or cancel, and that's it.

But first, let us prepare some space to use the Step Editor. This will just be an example to illustrate a point. Place the cursor at the beginning of the first measure and click once. Go to the Edit menu and go to the Insert Measure item, let go and a small pop-up window will appear, entitled **Insert Measure.** You can put, say, four, for the number of measures to insert and you can try either **All Tracks** or **Only on Track 1** (or the specific track you are on). Click **OK** and you should observe four *blank* measures appearing where there was previously some recorded notes.

One Step at a Time

Look at the diagram of this window, you should study this carefully. Somewhat below the menu bar, find the small window toward the upper left that looks like an icon of a tiny keyboard and click on this. Then, go just above this and find some note durations (each note represents the length used in step entry) and you can use any combination by pressing **shift** and clicking on a new value. Upon doing this, you can play some notes on your synth keyboard, and you should see each note appear as you play. If you decide that you don't want some of these notes, you can click backspace; for any and all notes that you just entered. If, while you are entering notes, you want rests to occur, push on the forward arrow; and in between entries you can change note values, to add or subtract. It is possible to arrange and to be able to change note values by depressing certain keys on your synth. To do this, go to the **Goodies** menu, to the **MIDI Keyboard Setup**, and explore. When you think you are ready and or willing to, as with using computers for any function, you will have to use your reasoning and try and figure what may or may not be profitable. Your needs will change continually, so what may seem irrelevant one time may be crucial at another time.

Back to step entry of notes—in playing back what you just recorded, suppose that you notice that you hear some notes but you do not see them pass by, in either of the horizontal directions, i.e., out of vertical range of the screen. Go to the Layout window and you will see Zoom In and Zoom Out. Notice the macro commands, they work on the fly, you will use them this way--so just try both of them. You will see that with the first you get a closer resolution and each note/data indication appears larger but you see less range of note/data on your screen. The reverse is true with Zoom **Out**. This is very important to edit your entries, to get a magnified view of your screen, to enable you to select note values with extremely short durations for editing as well as seeing all of the notes, to observe the patterns inherent (or not) to your music.

To the left of the keyboard step entry icon are three more icons that add possibility to your entering and deleting notes: On the far left is an **eraser**, much like you might find in a graphics program, and of course, erases, one note at a time, next to the right is what could stand for a piece of ***chalk*** and it has the capacity to enter whatever note value you have selected above these icons, plus you can move notes around by clicking on them and dragging to where you want them to be, and if you depress the option key as you drag, you get a *duplicate* note.

The **Step Editor** is a feature of MTPro you will be spending hours with to get your music right, learning ways to enhance your creative abilities—the ability to edit a range of notes, not just bars of music but individual or groups of notes, no matter how they were entered. At first, the piano roll appearance may seem uncomfortably unfamiliar, but soon you may find yourself utilizing the ad-

vantage of a different view on a way to read and represent music. These were only a few suggestions on using this window. You can think of the Step Editor as the pivotal to Master Tracks Pro.

Getting Serious About Editing

It may be that the best way to *not inhibit* your creative abilities is to learn the limits and potentials, experientially, of your electronic equipment. This holds true for the software aspect. There are a variety of reasons to develop a disciplined outlook toward an accurate as possible representation of sound image. One of which is to prepare your sequence for the possibility of communicating your music to enable other musicians to be able to develop reasonably and satisfactory interpretations of your concepts that allows the integrity of structure/dynamics to be forwarded.

What this means is that using a relatively sophisticated sequencing program that allows a note rendering program like the one next to be discussed, Music Writer™ to be able to put the notes in proper place so that the phrases, rhythms, harmonies, the textures, develop in an properly orderly manner, even if you are just developing outlines, sketches, fragments, of musical ideas. This is where the ability to shift the beats, quantize, maintain rhythmic sense *and* put harmonies in meaningful relationship. You try to utilize your windows to be a creative and purposeful expression. We view these potentials not necessarily as an inherently whole new way of looking at music, but as the addition of an electronic lever to facilitate sound production in a possible tool kit of the modern musician.

Save That Tune

Saving your work with MTPro is a very straight forward and easy process. Go to the **File** menu, pull it down, choose **Save As** and a window will appear. Create a **New Folder** if necessary, a title for your work, click on **Save**, or tap the **Return** key on your CPU keyboard and your work is now saved. Then, to save the changes for works in progress, once saved as.... requires you to simply use the **Save** in the **File** menu or **commands.**

Developing a disciplined outlook towards saving your work in progress can not only prevent the untimely and undesired loss of data but can actually be a part of your compositional development. For instance, if you are about to try something that you are highly uncertain of the outcome, save your work and if the experiment is not satisfactory, you can use the **Revert to Saved** command in the **File** menu to restore your music to the last save. This differs from the **Undo** command in the **Edit** menu as **Undo (or command Z)** will only undo the last single command... and there are some commands which are not undoable.

At this point, we shall stop again for a brief reminder to use your program reference manual, *and* your own curious urges to learn both more fully the features touched on and many additional features that give you an impressive range of flexibility in composing and developing sounds.

Getting Started With Music Writer™
Traditional Notation

We have been looking at an obviously different means of producing and representing musical sounds. Now we will turn to another program which utilizes more traditional shaped notes with bars, staves, and rhythmic meters divided into whole, half, quarter, eighth, thirty seconds of beats, etc. with various permutations or arrangements, set-ups are possible; bars and slanted beamed notation with accidentals (flats, sharps, etc.).

The heart of Music Writer™ (MW) by Pyware, is not so much in the number of windows and sequencing, or entering music by real or step time recording, as with MTPro, but rather in the one window for sets of bars and staves, the fields for the various tools called **tool palettes** which you access through the menu bar (as before, at the very top of your screen and once you have opened a score, new or an existing one) and or by keyboard commands (macros). The amount of possible sets of staves possible for this program, is determined by the level which you have purchased.... there are three levels: L*imited (3 staves), Special (8 staves) or Professional (40 Staves).*

As long as you have one of the latest version, installing MusicWriter on your Apple IIgs hard disk is very simple. Simply boot up your computer, put the backup copy of Music Writer™ into your floppy disk drive, and double click with your mouse on the installer icon and follow any and all instructions, and that's it— you should be ready to go. Find the **Music Writer™ Program icon**, double click to launch it and you should begin the journey to notation on your Apple IIgs. But you may as well disbar yourself from illusion. Music Writer™ will, especially at first, be mainly a means to getting yourself ready for doing what is a rather complex process, and your first efforts will closely resemble learning experiences, pure and simple. Once you get past the introduction window (welcome, version number, etc.) you will go to a bare screen with only a menu bar at the top. Go to the File menu, which will be the only item not dimmed, and choose new. You will get a small pop-up window which asks for the number of staves. For purposes of this example we will enter 2 (two), click okay or hit return and the main ***window*** will appear with a set of bars and to the left side of the screen will be an area (***tool palette***) with various notation symbols. (See Figure 4).

The first thing to do is to configure MusicWriter to your particular MIDI setup, so go back to the MIDI menu, slide the cursor with the mouse to the bottom of the menu field to **MIDI Options**, make sure the interface slot (the slot you use for your MIDI connection) is properly configured.

Contrary to MTPro, with MusicWriter™, you do not need to use an external synth, but you can, and frankly, will eventually want to. The **Synthesizer** item is to determine whether your computers internal sound capabilities are utilized either alone, with your external synthesizer or not at all. This is a feature you will have to set up according to your equipment, or desires to your working methods.

If you will be using the IIgs sound synth, you will also perhaps wish to configure the Play Options in

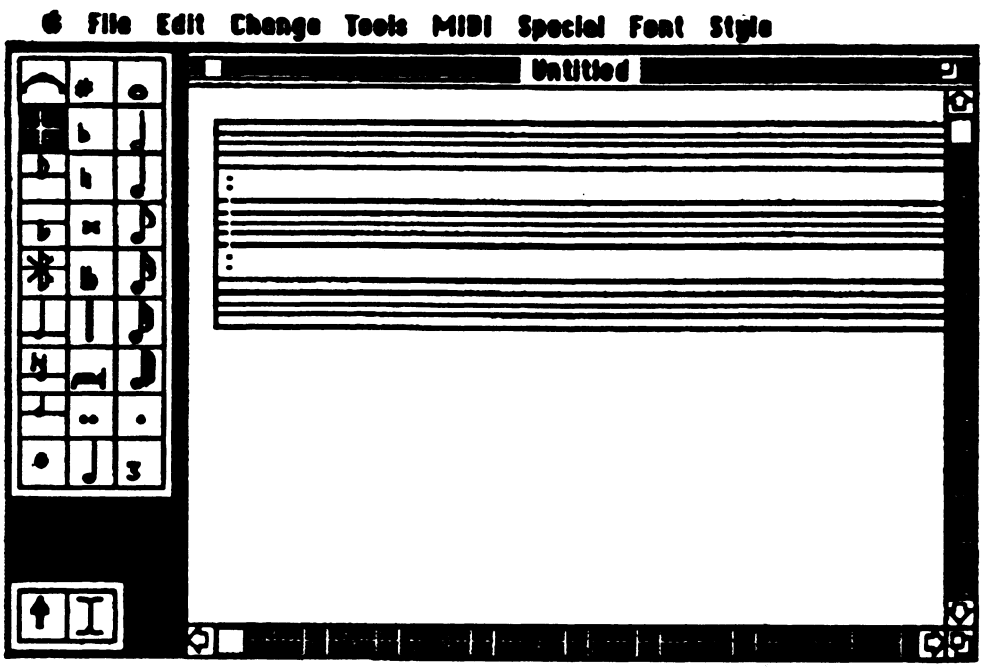


Figure 4.
This is the Music Writer main screen. The menu bar is at the very top. The "Tool Palettes" are at the very left and below this are the cursors.

the same MIDI menu. In any case, there are some options there worth understanding to optimize your chances of working with this program your way as much as possible. First, the **Send Clocks** which can (minimally) control an external sequencer. The second is **Limit Drawing**, if your CPU memory is limited or your composition takes lots of space or combinations there of, the **Limit Drawing** item selected will make the program do the barest refresh or redrawing of the screen—drawing only the staves and note heads, as the computer plays back; thereby leaving more memory room for actually playing.

In the Play column, any channel that has a hollow box will be turned off (the data will still be there). Rudimentary program changes can be effectuated with program numbers entered in the **Program** column, that is, only the starting program or voice(s), but this is probably not the first most important feature to learn. Changing the instruments, however is worth knowing about from the beginning, as there is possibly nothing more uninspirational and not conducive to learning music as an instrument voice which you cannot stand. Which, of course, resembles the age old paradox of "how do I know that it is my lack of skillfulness or a poor instrument, or variations there of." Click on one of the recorded channels in the **Instrument's column** (the default is Flute) and it will be highlighted. You then go to the Menu and click on **Instruments**, drag down to the desired instrument, let go, and you selected that voice for that stave. The **Transposition column** is handy to have, a part written in E flat *sound* in C major, for orchestrating in one key, then later, you can actually transpose each voice from your file for the printed sheets *(to do so, you will need to include the key signature).*

Cursors

There is, at the bottom left of your screen, a small window with two apparent tools in it. These are the **cursor keys.** Very important tools that enable you to do your work. Apparent because there are actually f*our* different main cursors.

The pointer. The first one, if you double click a note with it, you can change the playback values, but generally speaking, a rather thinly defined feature (almost no mention of it in the reference manual).

The I beam. The second is important for selecting ranges of notes for editing and changing. Also, if you wish to enter lyrics, you double click this and an I beam with an L appears, to revert you double click again (so *actually,* there are five cursors).

The cross hair The third is select a symbol in the tools palette. This cursor is for placing, adjusting and deleting notes; place over the stave space desired and with the symbol selected, click the mouse or to adjust the position of symbol, tap the CPU keyboard arrow in the desired direction

A larger cross hair is the forth and this will appear when the **Staff Tools** is selected. You may add staves or remove them, space them closer together or farther apart.

Before we proceed to enter notes or music, we should prepare ourselves somewhat in advance so that we get what we want as we go. There are two main areas to consider for now, in setting up, but keep in mind, that this is only a tutorial. Either to help you get started or perhaps, give you an idea of what notation on a computer will be like. The first is connecting the hardware and software together, in a desired manner, which we have already touched upon, the second is to set up your musical scores to enable you to enter notation, by several ways, so that you can, with some tweaking and plucking, get usable and meaningful printed musical scores.

Assuming that you already know and have some experience with written music forms, this is a good assumption to make as MusicWriter (or most computer notation programs) are not really designed to teach you fundamentals in music notation and theory. You will, however, need to learn the correct ***correspondence*** with the symbols that MW offers with your own needs and uses. You may also be advancing your actual

musical skills simultaneously. With the notation aspect, this is fairly clear, with dynamics and interpretive aspects of sound production, not quite so clear, especially in setting some of the (rudimentary) playback settings in MW. In other areas you will have try different features and settings to enable an experiential feel for how things will or will not work, but bearing in mind that a written appearance is the main focus. We already have the staves we need (2) to start and now, what quite likely will be the most difficult part of using MusicWriter; learning the tool pallets and not giving up when things don't work out the first, second, third or more times.

On Ward

Many of the **Tool Palettes** have *macros* to access them and within the notation pallet you can change the note values, including rests and triplets, etc. with *single key* commands, usually the first letter of the symbol is used, i.e.; **q** for quarter note. Keep your quick reference card handy when you work and use it. You will be surprised how you learn, and especially when you are in the midst of figuring a specific problem.

Go to **Tools** on the menu bar and select **Clefs** (or you can also access this and other tools by using a macro command, in this case; ***command 7***). This field will appear over the notation pallet, which is the default pallet. Click on the treble clef and then place the cross hair cursor on the top and left stave, click the mouse once and you should have a treble clef on that spot. Do the same for the bass clef on the lower stave. Once again, go to the **Tools** menu and select **Time Signatures** or use the macro *command 9.* Click on your preference of time signatures, for this example we will use 4/4; although, you can use multiple *meters* within the same piece of music. We are now prepared to start entering notes.

Entering Notes with MusicWriter

There are four ways to enter notes with MusicWriter:

1. From the notation pallet, selecting via keyboard or mouse. To place notes or other symbols *between* each other (*inserting*), with the proper symbol or note or rest value selected from the appropriate tool palette, press the **shift** key as you click the cursor over the proper placement on the staff and then clicking the cross hair cursor on the desired spot *carefully watching to see that the ledger markers that follow the cursor are over the staff you want your note (or symbol).* You may find some time that some notes do not respond to your efforts to edit them, this may be because they have, in fact, been *inadvertently placed on another staff.* To place notes above or below each other *(called stacking)* for chords, harmonies, etc., simply place the cursor, over or under the note and click. You can adjust the placement of notes or other symbols by placing the cross hair cursor over them and tapping the keyboard arrows in the desired direction. Similarly, you can delete symbols by so placing the cursor and tapping the **delete** key. You can alter whole blocks of music by selecting them with the *I beam* and using almost any editing capacity available in MW: cutting, clearing, transposing, beaming, unbeaming, barring and unbarring. Study carefully your program and the reference manual and try all possibilities. Perhaps setting a new set of ideas each time you use MusicWriter will allow you to find the necessary tools. But in any case, these entry forms are also useful for what follows.

2. To enter the **Mini Sequencer** you first select with the I beam cursor, which bars and staves you wish to place the sequenced music on the *main window* with **Paste to Document** *or* **Align to Document** when your sequence is complete. From the **MIDI** menu select **Mini Sequencer**. A window then pops up which resembles roughly, a tape transport, you can chose what point to *split your keyboard*, your *quantization* grid, *tempo* and whether to use **step** record, which means you enter one note whose value is selected, step at a time (tapping the **spacebar** on your keyboard which can toggle the note selected with a equal value *rest beat).* Or if you chose **Real** (time recording), you simply play the notes, the music in via your synth. You will find that this sequencer is *appropriately* called a **Mini Sequencer**, as its capacity for recording is limited, but very useful for developing phrases, harmonies, sketches, etc.

3. From the **MIDI Mouse** also in the **MIDI** menu, you select the note value in the note pallet, place the cross hair cursor in the desired location and tap the desired tone on your synth, moving the mouse to the next music space and clicking.

4. Imported from a standard MIDI file such as one produced by MasterTracks Pro or MasterTracks Jr. This option will be discussed shortly.

Playing Back On MusicWriter

You can playback your music through both the mini sequencer and the main window. With the **Mini Sequencer** the (mini) transport is right there, with the main window, you need to go to the **MIDI** menu and select **Play.** A small transport will pop out at the bottom of the screen and you can make adjustments in the tempo. But, you can select a range of music with the I beam and only it will play. You also can make some rough adjustments in the playback parameters via the Performance item in the **Change** menu.

Printing and Saving

With MusicWriter, printing your music is possible. In fact, you can, after you save your music to a file, get a **Page Preview** allowing you to see *approximately* your set up from editing the features in the **Special** menu; **Edit Header, Edit Footer** as well as your music. Music Writer can print with your ImageWriter or a Post Script Laser Writer printer. Make sure you have the proper printer drivers installed, go to the **Page Setup** in the **File** window. You will find that it will be profitable time spent *trying* different configurations in printing, in fact, this will be the only way you will find some reasonably satisfactory appearing and useful copy for your work. This may not always be fun, but hang in there, learn! Then go to Print **Options** in the **File** menu, it is highly recommended that you start out with a very small file for first exploring the options in printing so that each print out for examples sake, will take only a short time, thus giving you more time to try different settings. You will find, also, that for different settings or uses for your music will require different settings for your printed music copy. After you get the **Print Options** set up, go to **Print** in the **File** menu and unless you have saved your work and not made any changes since, you will get a window that says, **"File must be Saved before Printing," click OK**, a **Save As** window will appear. Create a **New Folder** if necessary and give your work a proper *ProDos* title, click **Save,** then you get the printer window. Set this up, making sure your printer is connected properly and turned on, click OK or tap **Return** on the keyboard and you should be in business printing music.

Working Together

Some anticipatory thinking by people who designed MIDI, which is an acronym that stands for *Musical Instrument Digital Interface*, a standardized approach to accommodating a great deal of diverse possibilities in musical sound production has led to a sort of *gateway* which allows us to open the doors of these two programs to each other in ways that also allows us to take advantage of the strengths of each one; this is called a **Standard MIDI File.** To get to this from MusicWriter you simply go to the **File** menu and select **Save as MIDI File,** you will get a **Save As** file, give a new path name to your music's' name or the notated file will be replaced. ***Or***, conversely, you can, when the main window for MusicWriter is not yet open, from the **File** menu, **Open MIDI File.** You get a **Quantize** and some other options which you should experiment with (these options are fairly self-explanatory), click OK and the MIDI file will be translated *to* a Music Writer™ file.

Now one place where you can get the MIDI file for Music Writer™ is from Master Tracks Pro or Jr. When you are in MTPro and you have a *sequence file* which you would like to be in *standard notation form*, it is pretty much the same procedure as for MW. In MTPro, Go to the **File** menu, select **Export MIDI** file and you get a pop-up window that asks you to **Choose MIDI File Type.** The default and proper choice is there for you: **Type 1 - One or more simultaneous tracks.** Click **OK** and you get a **Save As** window, do so, once a*gain careful of the path name you use*, and

the program will get to work translating to a MIDI file. It is pretty much the reverse procedure to import MIDI files to either of these two programs.

Good Music . . .

Real learning challenges are not entering just any music or sounds that you can playback but ones that have depth, strength and all the other attributes of good music. But this should not inhibit you from trying out ideas. Success will, perhaps, come in little bundles until you put a significant amount of material together to meet your musical goals really, such as the production of music. And even then, you may find that just as these goals come within reach... there are further possibilities to pursue and hopeful so. But with the use of computers in music, more specifically the computer and programs discussed, you will have to learn advantages and limitations of these programs to enable this further development of your music using computers.

It is this author's opinion that with the above, briefly discussed tools, with patience, perseverance, perspicacity and determination you will learn how use each one. This can enable you to develop musical expression, using sound and sense, for your vision and imagination, talent and skills. So you may find, if you pursue the above with rigor and appropriate seriousness, that your needs will grow and you may find with time that more powerful hardware or software will be desirable. Already we have other possibilities to choose from, i.e., IBM and Macintosh.

Changes in the digital world seem to be happening over night. Large capacity optical storage disks, hard disk recording, analog/digital recording, strides in sound sampling. Many developments to look forward to. But we need also, to be prepared with basic information, not only so that we may launch ahead and develop a future for ourselves through innovation, but develop and keep a critical sense so that we do not squander but, in fact, continue to develop and work with what advantages we have.

Chapter Five: Innovations and Product Descriptions

INNOVATIONS & PRODUCT DESCRIPTIONS

This section, *Innovations and Product Descriptions*, is a fascinating product listing and acknowledgment of new, different, useful, enhanced, worthy of knowing they exist, or just amazing MIDI-based products for your consideration. Each day new and exciting MIDI-based products are released to thrill us, entertain us or otherwise challenge us. MIDI-based education products have also been included.

A MIDI-based music system including a computer, MIDI interface, multi-timbrel keyboard or sound module can be implemented even if you do not play a musical instrument well. Some of the following products will help you explore, get started, or take a new avenue with MIDI; even if you can't enter MIDI data/musical notes well enough by means of playing in real time a keyboard/synthesizer. An idea may be to select your favorite prerecorded MIDI sequences and become a sound engineer for playback with your own MIDI equipment and sound system!

General MIDI

To further support nonmusicians and electronic musicians, music education, MIDI enthusiasts, and the home music entertainment markets the General MIDI (GM) standard has become a wonderful new MIDI path to explore. Roland basically started the industry moving in the direction of the GM standard during the 1990's by developing GM savvy devices like Roland's Sound Canvas, SC-155, Roland's JV-30 and JV-80 synthesizers, then came Korg's 03R/W and Yamaha's TG100 sound modules. Instead of wondering how to program the correct patch and note assignments for your MIDI device, by using a GM savvy device a GM score can be loaded in to a computer's sequencer or hardware device and new interactivity and played back becomes available with virtually no modifications. The GM has many implications for the home MIDI markets, and schools. Music education can incorporate prerecorded GM MIDI scores with a GM MIDI device for music theory, orchestration, ear training as well as in performance.

The MIDI Manufacturer's Associations (MMA) and the Japanese MIDI Standards Committee (JMSC) are still hammering out some of the final codes and specifics, but in theory, this new standard will be an exciting addition to the field of musical electronics. In other words, the GM standard will start to make life easier for nontechnical people. Look for GM supported products.

(Most products below are available from Sound Management, Electronic Music Products, P.O. Box 3053, Peabody, MA 01961. Telephone: 800-548-4907, Fax: 508-532-6106, or 508-531-6192.)

• **Piano MIDI Connection**. Turns your standard piano into a MIDI controller with full velocity, sensitivity, aftertouch, 64 presets, 4 keyboard zones, MIDI program changes, assignable piano pedals, transposition, 16 MIDI channels . Gulbransen, 800-677-7374, 800-548-4907 or 619-296-5760. Canada call: 604-925-3263.

• **Classical MIDI Files**. Can't play a note, use this MIDI file library of classical music from Beethoven to Mozart and your sequencing software and MIDI devices to play these wonderful selections; supports Mac, IBM, Atari, Amiga computers. Romeo Music, 214 Lincoln Street, #104, Allston, MA 02134. 800-852-2122, or FAX: 617-254-9170

• **MIDI Sequences**. Pre-sequenced popular music saved on disk, hits of the 50's, 60's, 70's, Big Band Sounds. All computer formats and even for use with some dedicated sequencer hardware. Tran Tracks, 350 5th Avenue, #3304, NY, NY 10118. Telephone: 800-473-0797, Fax: 201-383-0797 or 201-383-6691.

• **Phil Wood's MIDI Hits**. Over 2900 sequencers with that off-the-record sound, including the top 40, classic rock, jazz, C & W, standards, big bands. Phil Wood's MIDI Hits 485 Gianelli Street, Tracey, CA 95376. Telephone: 800-484-1096 ext. 3525, Int'l 209-832-0225, Fax: 209-832-0460.

• **MIDI Hits**. Over 1700 sequences, top 40, classic Rock, Jazz, C&W, standards, Big Bands. Phil Wood's MIDI Hits, 3450 Granada Ave., Suite 50, Santa Clara, CA 95051. Telephone: 800-484-1096, ext. 3525, Fax: 408-984-0944.

• **Trycho Tunes**. 1300 current top 40, oldies, standard, and C & W. Trycho Music International, 2166 W. Broadway Street, Suite 330, Anaheim, CA 92804. Telephone: 800-543-8988, 714-826-2271, Fax: 714-995-8079.

• **MIDIFile Player**. This Atari ST external add-on device connects to the CPU of the ST and acts as a music-player device that can load 32 songs (Standard MIDI File Format Songs) and plays them while loading others, include software and has a small LCD display for monitoring. TranTracks, 350 fifty Avenue, #3304, New York, NY 10118. Telephone: 201-383-6691.

• **Five Pin Press**. Having trouble with MIDI sequencing and creating drum patterns, use these Standard MIDI Files that work with virtually any sequencing software and a Mac, IBM, or Atari. P.O. Box 550363, Dallas, TX 75355-0363. Telephone: 800-726-6434, support 214-328-1092.

• **Miracle Music Teaching System**. This system brings the joy of learning how to play the keyboard to your home or classroom. Artificial Intelligence software assists and monitors your progress and develops a personal training program for you. System incudes a manual, teacing software, and touch-sensitive MIDI keyboard. for the IBM or Macintosh. 800-548-4907.

• **Band-in-a-Box**. This fascinating software for the Mac, IBM, Atari ST is an incredible automatic accompaniment program. Just type in the cord sequence and select anyone of 75 styles and Band-in-a-Box does the rest. Available through Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Sound Blaster Pro**. The most popular speech/music/voice/MIDI/game port that is the ultimate IBM PC sound board. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Sybil**. A real-time MIDI performance program created specifically for the MIDI performer. This highly acclaimed software lets the user spontaneously create music while playing your MIDI instrument. With Sybil, you control the notes, rhythm and instrumental sounds of your synthesizer through the noes you play, in real-time, without missing a beat. A fun and easy to use for the Mac or IBM. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Jammer**. The Jammer can turn your computer into the ultimate MIDI studio for the IBM. A 256-track studio for creative music making. The Jammer, Order or Demo Disk: 404-623-0879. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Proteus /1,/2, or /3**. A MIDI module for high quality sounds, orchestration, world sounds, synth and standard rock. Image having access to 16-bit, 16-channel, 32 voice polyphony and hundreds of quality digital sounds from a grand piano to a 30,000 year-old Australian didjeridu. E-mu Systems, Inc. P.O. Box 660015, Scotts valley, CA 95067-0015 or Sound Management, Peabody, MA 01961, 800-548-4907, 508-531-6192, Fax: 508-532-6106.

• **MIDI Accord**. A MIDI accordion controller, amazing device that can send nine MIDI channels of MIDI data. Manufactured by Baldoni MIDI Accord. Telephone: 414-276-4969.

• **MIDI Fingerboard Controllers**. The Data pump 620 and the Magnatar 1223. Guitar like has fretted body and rows of strings/buttons. Very interesting device for unusual applications by Starr Switch Company. Telephone: 800-428-8884 and 619-233-6715.

• **Sound Globs**. Image yourself as a MIDI conductor who doesn't have score, leading a group of players who lack sheet music. To begin a performance you tell the players to play anything they want. Then you refine what they're playing. The user creates exciting music, even if one doesn't now how to put notes on a staff or doesn't have

keyboard skills. Cool Shoes Software, 116 Churchland Drive, Winston-Salem, NC 27101. Telephone: 919-722-0830.

• **Instant Pleasure Software**. Getting your MIDI sequences to sound more human and warmer is very time consuming. Instant Pleasure Software will import your Standard MIDI Files and will polish the recording, easy to use and learn. This unique software is not only a studio finishing tool but fun for the whole family. Once you've set up the software, you can learn to perform songs in a matter of minutes—even if you can't play a note. The software comes with many preprogrammed songs and you can order most popular songs from the extensive catalog. Martin Shawn, Inc. 1445 Summit Street, Columbus, OH 43201. Call 614-294-1002.

• **MIDI-Cyms**. A new innovative choke circuit/ pad interface MIDI units for MIDI drummers. MIDI-Cyms, 840 W. valley Blvd., Alhambra, CA 91803. Telephone: 818-282-4156, Fax: 818-282-6242.

• **Jazz Through MIDI**. Learn jazz improvisation with a MIDI sequencer. An original approach, can be used by player at all level of ability, includes 60 professional arranged solos with rhythms accompaniment of bass, piano, and drums use with Roland, Kawai, Korg, Alesis, Yamaha, Ensoniq, Macintosh, IBM, Atari ST, Amiga. New Sound Music, P.O. Box 37363, Dept. J1, Oak Park, MI 48237. Telephone: 313-355-3643.

• **The Stick**. A full-ranged touchboard MIDI instrument and **The Grid** Fingerboard MIDI controller with regular stick strings, and ten uniformly thin strings. Stick Enterprises, Inc., 6011 Woodlake Avenue, Woodland Hills, CA 91367. Telephone: 818-884-2001, Fax: 818-883-0668.

• **Classical MIDI Files**. Over 5 million classical MIDI notes available in many computer and sequencer formats. Romeo Music International. Telephone: 800-852-2122.

• **Electric Violins**. A unique string instrument without the traditional violin body and head. The instrument has shoulder pads, chin rest, crystal pickups, preamp, mixer, and optional MIDI converter. Steinberg Sound Corp. 122S, Robinson Avenue, Newburg, NY 12550. Telephone: 914-565-4005.

• **MIDIVox**. A unique MIDI device call the MIDIVox—Growl a trumpet, Croon a sax, hum a bass, scream a guitar, laugh a clarinet, yell a cello. $1595 with a two year warranty. MIDIVox 800-433-MIDI (6434).

• **Electric String Instruments**. Violins, cellos, classical upright basses with preamps, volume and MIDI options. RAAD Instruments, P.O. Box 283 Commerce Ct.. West, Suite 4150, Toronto, Canada M5L 1E9. Telephone: 416-869-1240.

• **The Vocalist VHM5**. A natural 5-part voice processor that really sounds like human voices for harmony and pitch correction. Digitech, DOD Electronics Corp., 5639 South Riley Lane, Salt Lake City, UT 84107. Telephone: 801-268-8400.

• **Hyperchord**. A unique, creative software tool for the Amiga or IBM/compatible that allows a user to create amazing music-riffs with intelligent software. Hologramophone/Centaur Software, Inc. P.O. Box 4400, Redondo Beach, CA 90278. Telephone: 213-542-2226 and Cilantro Computing Services. Telephone: 612-636-5777.

• **Pixound**. A unique IBM music/light show software program that allows one to utilize music, color, light to create unusual results. The software allows the user to control and adjust sound visually. Hologramophone/Centaur Software, Inc. P.O. Box 4400, Redondo Beach, CA 90278. Telephone: 213-542-2226 and Cilantro Computing Services. Telephone: 612-636-5777 or 800-548-4907.

• **EM Finger Drum Kit**. After building the finger drum pad kit, this amazing device allows you to lay down drum patterns by tapping your fingers. PAiA Electronics, Inc. 3200 Teakwood, LA, Edmond, OK 73013. Telephone: 405-340-6300.

• **MIDIator**. An external serial MIDI interface (1 IN x 1 OUT or 1 IN x 3 OUT) for IBM laptop or notebook personal computers that is compatible with many of leading MIDI sequencing software package including Cakewalk. Key Electronics, Inc., 7515 Chapel Avenue, Fort Worth, TX, 817-560-9745. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Roland JW 50 Music Workstation**. A complete, stand-alone music workstation that integrates a sophisticated sequencer, wide array of built-in sampled sounds and effects, a sixty-one note keyboard with velocity and aftertouch, and extensive compu-mixing capabilities. Roland Corp US, 7200 Dominion Circle, Los Angeles, CA 90040-3647. Sound Management, 800-548-4907.

• **Roland JV 30**. General MIDI, easy-to-use, multi-timbrel sample-playback synthesizer with a low price. An incredible array of 445 high quality tones, eighteen drum kits and on-board digital effects. The JV-30 has sixteen-part multi-timbral capabilities and twenty-four voice polyphony. Roland Corp US, 7200 Dominion Circle, Los Angeles, CA 90040-3647. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Roland Sound Canvas**. SC-155 High end General MIDI (GM) sound module that has 317 lushly orchestrated sounds for arrangements and can play up to sixteen different parts at once. Perfect for expanding your existing keyboard/MIDI system or main controller keyboard. The Sound Canvas is ideal for home recording and stage performance, and is a perfect match for Roland's SB-55 Sound Brush. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **MIDI School**. Interactive MIDI Tutor. Full function sequencer, built-in glossary, student notebook for progress and lesson planner.
EduACTIVE, Telephone: 800-824-4788, or 603-668-4788.

• **Compose Yourself**. Interactive Learning Software. Complete "How To" Composing Package. Package includes 8-track sequencer, chord computer, composer strategies HyperCard Stack, Learning cassette, complete user manual. MacBeat, Telephone: 800-MacBeat, 505-473-4929. Fax 505-473-4647.

• **Opcode EZ Music Starter Kit**. A complete music studio that includes Opcode's MIDI interface, EZ Vision sequencer software, Band-in-a-Box automatic accompaniment software, and the Book of MIDI learning software. You will need a Mac Plus or higher, a MIDI-equipped musical keyboard, a pair of 6' or longer MIDI din-pin cables to connect your keyboard to the MIDI Interface. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Opcode Studio Vision with Audiomedia**. Studio Vision 1.32 integrates complete MIDI sequencing software with digital audio recording and SMPTE synchronization for the Macintosh. This fascinating Macintosh package includes Audiomedia digital audio card. The user will be able to create a fully orchestrated MIDI soundtrack and add narration, singing, or live instruments within the Studio Vision MIDI file. The Audiomedia card records a stereo pair of channels at full CD quality on the Mac's hard disk drive. This has a graphic interface for on-screen editing and manipulation of the digital audio tracks. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Passport Designs Encore**. Easy, professional music notation MIDI software for the IBM and Mac. This powerful software produces publishable quality sheet music. Play music from your MIDI-equipped keyboard or use a mouse or import a standard MIDI file from your software sequencer music files or purchase pre-sequenced MIDI files (see above) and obtain PostScript page layout printed scores. Perfect for individual, pro's, schools, choral directors, churches. Includes Adobe Type Manager and the Sonata font as well as Passport's Frets guitar chord font. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106. *(Note of Interest: During the course of the year, Sound Management consults to a variety of users.*

Recently a transactions with a church group encompassed a MIDI solution pack containing: Encore for the Macintohs Classic II, a 2 x 6 Altech MIDI interface, a Roland A30 MIDI Master Controller, Proteus 2 and 3 sound modules and a postscript Zulu font for Encore to produce lyrics and musical notation lead and sing sheets in their native language.)

• **MusicWorks.** A $99 MIDI sequencing for the IBM PC. 256 tracks, 24 to 480 PPQ, 401 and MQX MIDI interface compatibility, SoundBlaster support, 64 MIDI channels, graphical user interface, DOS based, SMPTE-MTC, standard MIDI file support, piano roll, full event editing, and intuitive tempo mapping. 510-865-9189.

• **ARS Nova Practica Musica 2.3.** Macintosh music software that teaches the user music in a format designed especially for variety and user interaction within its learning structure. Goals of the software include read and write music with activities covering pitch reading, scales, intervals, chords, rhythm and melody. Ear Training activities include full melodic dictation and four-note chords, beginning with simple triads and moving through seventh chords in inversion. Practica Musica can work with MIDI keyboards or just the Macintosh. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Imaja Listen 2.1.2.** This music education software teaches the user how to identify the basic building blocks of music. Listen teaches how to recognize intervals, melodies, and chords when you hear them in key. Exercises range from beginner to advanced lessons and allows the user to work at one's own pace. The software covers triads, sevenths, ninth, eleventh and thirteenth chords and their inversions plus melodic sequences of increasing lengths. Listen can be used with the Macintosh alone or with a MIDI interface and keyboards. Sound Management, 800-548-4907, 508-531-6192, Fax: 508-532-6106.

• **Passport Design's MasterTracks Pro.** MIDI 64-track software sequencer used with a MIDI interface, MIDI keyboards/sound modules and an IBM/compatible or Macintosh computer. The software features ease of use in recording, editing, automated mixing and control over all MIDI devices for creating and playing music and syncing via SMPTE. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Passport MusicTime.** Music notation software for IBM and Mac that has a similar user interface to Encore but is more affordable and has additional playback features. With MusicTime you can play, compose, record and print out music and playback you files in vary of combinations with a Macintosh computer, MIDI interface, and MIDI equipment. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Dr. T's QuickScore Deluxe.** An entry level IBM MIDI notation program. QuickScore Deluxe is the ideal program for the novice or amateur computer musician. It's easy to create music; just use the mouse to draw in the notes or record them in real time using a MIDI compatible keyboard and them hear them play back. In the step time mode you can play notes using they keyboard and immediately see them appear on the computer screen. QuickScore Deluxe is compatible with MIDI, SoundBlaster, and Media Vision. Some features include: Real time/Step time MIDI input, Mouse note-input via notation, Auto-scrolling with playback, 16 stave/tracks display, Printing with most popular printers, print-page preview, text and musical symbols can be entered and placed anywhere on a page, Cut, copy, paste, and insert modes of editing, Undo function, Transpose—chromatically or in the key, etc. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Dr. T's Intro Plus Packages: IBM or Mac.** Get set up quickly and economically with Dr. T's all-in-one hardware and software package deal. You will get sequencing software, music notation/printing software, a MIDI interface, two MIDI cables for connecting your MIDI device to the MIDI interface and plenty of support! Sound Management, 800-548-4907.

• **Dr. T's Adventures in Musicland**. Based on the characters from Lewis Carroll's Alice in Wonderland, Adventures in Musicland, is a unique collection of musical games specially created for children of all ages and abilities to be used on a Macintosh. Children do not need to be musicians or music students to play these games. But as they play their understanding of sounds, musical tones, composers, and even musical symbols will be developed. The four games include: Music Match, Sound Concentration, Melody Mixup, and Picture Perfect. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Bars & Pipes Professional**. Amiga music software that provides an unlimited number of tracks and notes for composing music. Its sequencer boasts all the features and presents unlimited methods of non-destructively editing your music in real time. In summary Bars & Pipes Pro will enhance your music as you compose, playback or edit. Print your music at any time for concert score, transposed score and individual parts, with lyrics, chord symbols, measure numbers, labeled sections, page numbers, author, title, and wide selection of automatic transpositions. This software also will mix, and sync SMPTE and MIDI file format. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **MiBac Music Lessons.** The music education software is an easy-to-use Macintosh program that helps the student learn the elements of music theory. Each of the eleven drill have multiple skill levels that make it just right for the beginner, yet powerful enough for the advanced. Music Lessons provides drills for mastering the following musical skill: Note Names, Circle of Fifths, key Signatures, Major/Minor Scales, Modes, Jazz Scales, Scale Degrees, Intervals, Note/Rest Durations, Ear Training, Intervals, Ear Training Scales. Sounds can be played through your MIDI keyboard or form the Macintosh using the program's high-quality grand piano sound. You can also answer the correct response from a MIDI keyboard or by clicking the on-screen keyboard. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **PianoWorks Software Course**. The PianoWorks IBM Level 1 Software course contains more than 180 lessons with over 1500 exercises. Together they provide more than 40 hours of interactive instruction and practice to teach you the basics of piano playing. While taking the course, the student will also be learning and playing songs from the *Alfred Basic Piano Library Complete Level 1 Lesson Book,* which is also included. PianoWorks Software can be used with MIDI. Available from: Sound Management, 800-548-4907.

• **Cakewalk Professional for Windows**. IBM music sequencing software with a 256-track graphic MIDI interface for Microsoft Windows 3.1. This new release makes the best-selling high powered MIDI sequencer Cakewalk easier to use with a variety of graphical views. View and edit MIDI notes in piano-roll, staff notation, or event-list formats. Draw tempo changes, velocity levels, and pitch bends with your mouse. Mix volume levels with graphic faders. While your music is playing, change sound assignments, panning, tempos, pitch transpositions, and more. Cakewalk Pro for Windows is ideal for music composition, audio production, video or film scores, radio and multimedia applications. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Alchemy**. This powerful program is professional multimedia 16-bit audio editing software to be used with any sound sampling device and a Macintosh computer. Alchemy provides a fast and elegant way to retrieve, edit and store sampled sounds. With alchemy you can create any sound imaginable! With its powerful harmonic spectrum editor and resynthesis capabilities, Alchemy gives the user sound designing capabilities. You will be able to playback direct for disk, amplitude and frequency edit, time scale and pitch shift, harmonic analysis and resynthesis, distribute audio networking, digital signal process, provide true stereo editing and create automated fades and crossfades. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Audiomedia**. Audiomedia turns the Macintosh II line of computers into a self-contained digital-recording home studio. You will be able to play back, edit, mix sound files and apply a variety of special effects. This powerful software has CD quality sound that will take up large amounts of your hard disk—10MB per minute. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Sample Vision.** Sample Vision for IBM computers is one if the most advanced sample editors on the market. It is directly compatible with two dozen of the most popular samples. The program is designed for easy use in studios that have multiple samples; it can instantly conform to another. It can also deal with files that are created by the Macintosh sample editor Sound Designer, as well as files created with many university and mainframe-based sampling systems. Sample editing is a high art. It involves analyzing waveforms over time, performing mathematical transformations of the sound or various part of it, mixing and splicing sounds together seamlessly, and setting "loop points" for the sustain and decay portions of a sound. Like most other sample editors, sample Vision is graphics-oriented. It displays sounds as a waveform (level versus time) or as a distribution of frequencies. Several zoom levels allow the screen to show as few as 16 or as once. An animated function shows one cycle of the sound as it develops; you can stop and examine the waveform on screen at any time. Sample Vision editing function include cut/copy/paste, waveform drawing with the mouse, mixing two sounds together, and cross-fading between two sounds. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **M.** Sequencers help composers write music much the way they would in a recording studio, by turning the computer into a highly sophisticated tape recorder. But there are other ways computers can assist the creative process. Algorithmic composition programs provide a kind of "what-if" environment, in which the composer specifies certain musical parameters and lets the computer generate notes that fit. M is an extremely complex and useful algorithmic composer. Patterns up to several hundred notes long can be entered, either via a MIDI keyboard or directly onto the screen with a mouse. Twenty-four such patterns can be stored in memory, and up to four can be active at a time. The notes can be played in the order in which they were entered; they can be scrambled so that, each time around, the pattern repeats itself in the same reordered mode; or they can be randomized. In addition to note order, you can impose rhythms, accents, and articulation (e.g., staccato and legato). The four patterns are all independently adjustable. All of the parameter settings are stored in "boxes," and you can change the music by altering a setting in a box or by jumping from one box to another. Besides serving as a composer's scratch pad, M can work as a performance program. Movement of the mouse controls, in real time, changes in various parameters. Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Music Mouse.** Despite its relative simplicity, Music Mouse can produce a surprising range of musical effects for the Macintosh, Amiga, and Atari computers. Music Mouse gives appealing results almost instantly. Getting started is a snap: move the mouse, and four voices of music start to play. The voices of music start to play. The voices of music start to play. The voices can be generated either by the computer's internal sound circuitry or by external MIDI devices. Move the mouse to the right and up, and the notes get higher; move it to the left and down, and they get lower. A screen display that looks like a two-dimensional keyboard shows the position of the mouse and the voices. Pressing different keys on the computer keyboard invokes various parameter changes. You can choose from several scales (diatonic, chromatic, pentatonic, and so on), change key, and group voices so that, for example, one voice is controlled by vertical mouse movement while three voices respond to horizontal motion. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Finale.** Coda's Finale, the flagship, is a highly evolved piece of software for the Macintosh and IBM computers. Notes can be entered singly

or in real time, and the program generates publication-quality scores using a laser or Linotronic printer. The program automatically changes its quantization (rhythmic resolution) level as you play, so that the rhythmic complexity of the printed music remains appropriate to the context. It can also—when it is writing on two staves at a time, piano-score style—figure out which hand is playing which notes by tracking the intervals between the notes and determining when an interval is too big for one hand to play. Another convenient feature links text to notes so that lyrics don't get scrunched together on the page. And you can create your own kind of notation—a little squiggle, for example, can represent a certain kind of pitch bend, such as a trumpet smear. After the symbol is defined, you merely call up the graphic and insert it each time it's needed. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **Beyond**. Dr. T's sequencer for the Macintosh. A great product for a MIDI starter or if you are upgrading from a low-end sequencer. Complete MIDI sequencer software with the Macintosh user interface and easy to learn sequencer commands. This software comes complete with an excellent manual and tutorial. Beyond can be packaged with Dr. T's Intro Starter Pac that includes a MIDI interface, a pair of MIDI cables, and notation software. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **SysEX GS**. A MIDI graphical program that can transfer a large variety of MIDI system exclusive messages, including custom patches, keyboard sequences, set-up info. from the GS to your keyboard. Uses either external or internal MIDI interfaces; does not work with Casio products. Runs on GS/OS. No copy protection. Available from: 800-548-4907, Fax: 508-532-6106.

• **MidiMate**. Dr. Lindsay B. Hough (programmer of the well-known SysEX GS software) has recently developed a new Apple IIGS program designed to enhance the musical power of SynthLAB by Apple Computer that converts the GS into a 7-voice multitimbrel synthesizer. If you're a SynthLAB user who loves the synthesizer but are frustrated because SynthLAB lacks musical editing ability, then you may be interested MIDIMate. MIDIMate converts standard MIDI files (SMF) from your favorite sequencing program (MasterTracks PRO or MasterTracks Jr. or Audio Animator) into SynthLab—compatible files. Users can create up to 7-track 40K sequences, edit them with their sequencing software, and when they are perfect, translate them with MIDIMate, and then play them with SynthLAB and your GS sound chip. Available from: Sound Management, 800-548-4907, Fax: 508-532-6106.

• **ConcertWare+MIDI.** ConcertWare+ MIDI is a Macintosh composition and transcription program that can record multiple notes from a MIDI keyboard. Known for its easy of use this eight track eight voices each is moderately priced for anyone starting out with their Mac/MIDI system! Sound Management, 800-548-4907.

• **Cubase Macintosh and Atari ST**. An accurate and powerful yet easy to use sequencer that lets you edit while your music is playing. Four windows for editing of instruments at the MIDI event level will help produce a professional sequence of music. Cubase also has toolbox controls for sounds and a logical editor that fine-tunes compositions according to Boolean selections and editing criteria. Sound Management, 800-548-4907.

• **Deck**. This amazing software will let you mix and sync MIDI and/or acoustic sounds/music in CD-quality stereo. Digidesign's the manufacturer has created this software/recording system with the Macintosh interface that looks just like you were using a four-track Tascam Porta Studio cassette recorder. Sound Management, 800-548-4907.

• **Deluxe Music Construction Set**. This Macintohs music composition software by Electronic Arts is an excellent choice for a beginner or for a school environment just starting to explore music software. Use MIDI or your Mac's internal speaker to enter up to 48 voices on eight staves; the mouse will come in handy when you playback, edit, and print. Sound Management, 800-548-4907.

• **Digidesign Mac Proteus**. Revolutionary Mac II NuBus card will turn you Macintosh into a powerful music machine all with remarkable sounds. The card will operate just like a MIDI controller-module/keyboard but the sound is internal and its all done form your desktop environment. This system uses Apple's MIDI Manager and Patch Bay and can play 16-bit, 39-KHz mono or stereo samples. Sound Management, 800-548-4907.

• **Opcode Galaxy.** This powerful, professional Macintosh Universal Librarian works with nearly 100 MIDI devices. Uses a new "PatchTalk" language that supports any future instrument and allows the user to create your own file types. Supports 32-MIDI Channels, Records and playbacks standard MIDI Files for patch testing, works with Apple's MIDI Manager and can check for duplicate sounds, even with different names. Sound Management, 800-548-4907.

• **Pyware MusicWriter Apple IIe, IIGS, Macintosh, IBM.** One of the few music notation software MIDI or stand-alone GS software packages developed. Complete package that allows the user to enter notes via the mouse or MIDI equipment, then transcribe, edit, add lyrics, chords, and print. Very easy to use but has the power, flexibility to enter music in Real Time and Step Time and saves in the Standard MIDI File Format. Sound Management, 800-548-4907.

• **Harmony Grid**. VPl Research, Inc. offer an experiential approach to harmony basics and theory. This unique software uses a grid to show scales and chords as repeating patterns. Like Music Mouse, Harmony Grid users play tones by moving the mouse over the grip on screen, resulting in improvisation without any specialized skills. Turn on your synthesizer, add a MIDI interface make music. Sound Management, 800-548-4907.

• **Opcode's MIDIPlay.** Macintosh and HyperCard based. this software will integrate MIDI sequences/ MIDI song files into multimedia presentations. MIDIPlay is a tool for HyperCard stacks and for using sound-controlling buttons; therefore exporting files and sounds into the well-known programs such as SuperCard and MacroMind Director. Sound Management, 800-548-4907.

• **Mark of the Unicorn's Performer**. A top-of-the-line, full-featured, Macintosh, superstar, MIDI sequencer with SMPTE syncing, 32 MIDI In's and Out's, Looping, overdubbing, and ready for Professional Composer for notating. Features such as humanization to the concept of accelerando and decelerando, separate regions on any number of tracks can loop, logarithmic and S-curve tempo changes make Performer extremely powerful, elegant, and professional. Sound Management, 800-548-4907.

• **Mark of the Unicorn's Digital Performer.** Digital Performer creates a new frontier for desktop music production by integrating MIDI sequencing and digital audio recording for the Mac. Digital Performer allows you to record CD-quality and sequenced MIDI instruments in a creative environment. Requires a Macintosh II or higher, 8 MB and hard disk drive. For many projects, Digital Performer eliminates the need to sync to a tape recorder. Uses as much as possible identical displays and commands for both audio and MIDI recording/editing.
Sound Management, 800-548-4907.

• **Mark of the Unicorn's Mosaic**. An elegant, musically intuitive tool for printing scores, parts, lead sheets, lyrics on the Macintosh. Real time MIDI inputs lets you perform musical pieces on a MIDI keyboard and then have Mosaic automatically turn them into scores. After recording, you can immediately display your music in "PageView" Mode. Additional features include: WYSIWYG environment, standard Mac-like graphic interface, straightforward click and drag interface to insert and place symbols, unlimited Undo/Redo, unique spacing algorithm for automatic typographically correct formatting, standard graphic handles to reshape slurs, ties, and brackets, easy to use commands and palettes, precise control of page margins, staff placement and other page layout features, customized page layout templates for large documents, and uses Standard MIDI files.. Sound Management, 800-548-4907.

• **Mark of the Unicorn's MIDI Time Piece II.** An easy-to-use, backlit LCD, multi cable MIDI interface/Merger/patchbay/synchronizer. This device is fully programmable from the front panel, controls original MTP, 16 x 2 LCD display, 128 scene dynamic memory, four data control knobs, 64K fast RAM, Panic Button, responds to MIDI patch changes, and has an internal power supply and has two foot pedal inputs. Sound Management

• **Mark of the Unicorn's Digital Waveboard.** An affordable priced standard NuBus card that will run in any Mac II or Quadra that provides four tracks of direct to disk recording. Installation takes seconds and your computer is transformed into a digital recording studio. Four virtual tracks of random access digital audio recording and playback is ready to go with professional stereo AES/EBU and SPDIF digital input/output connections. With the Digital Waveboard you can use the analog to digital converters in your DAT recorder or any standard A/D-D/A converters as the front end for your Mac digital audio system, simplifying your system. Requires Digital Performer, Macintosh II or higher, 8 MB of RAM, hard disk drive. Sound Management, 800-548-4907.

• **Mark of the Unicorn's Wavelink.** A digital to analog converter with 8 times oversampling and 18 bit resolution. Connectors include AES/EBU and SPDIF In & Out, and balanced +4 and unbalanced -10 outputs. Sound Management, 800-548-4907.

• **Mark of the Unicorn's MIDI Mixer 7s.** A single rack mixer for the Macintosh, Atari ST, or IBM/PC compatibles, the MIDI Mixer 7 is a powerful line mixer for up to seven stereo inputs—from synthesizers and effects processors to tape recorders and microphones. The system uses complete automation using MIDI continuous controller data. Includes volume, pan, treble, bass, two stereo effects sends and eight stereo noise gates. Includes software for specific platforms 800-548-4907.

• **Mark of the Unicorn's Video Distribution Amplifier.** Not computer dependent, a 3 x15 switcher/router hardware for video signals, can be used independently or with VTP.

• **Mark of the Unicorn's Video Time Piece.** For the Apple Macintosh VITC and LTC SMPTE time code synchronizer/generator, includes software DA (Disk Accessory)

• **Opcode's Vision.** Top-of-the line and professional—Opcode didn't forget a thing when they designed Vision for the Macintosh, including MIDI Keys, a function that allows you to control your Mac from your MIDI keyboard. Opcode recommends Studio 3, 4, or 5 for your MIDI interface, with multiple in's and out's and SMPTE syncing, both are flexible. Vision has professional features for arranging songs and chaining sequences with no track limitation. Sound Management, 800-548-4907.

• **Digidesign SampleCell.** Use a Macintosh II family computer, a hard drive and CD-ROM then install this NuBus add-on card with 8 MB of RAM, sample playback that features 600MB of prerecorded sounds on CD-ROM and great software tools. Supports MIDI equipment on 16 channels and is MIDI sequencer software and Apple MIDI Manager compatible. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. Telephone: 415-688-0600.

• **Passport Design's Trax.** Be your own music producer with Trax for the IBM and Macintosh, Windows compatible and complete Macintosh interface. 64 tracks of MIDI desktop recording, edit and playback on MIDI equipment. Trax is as easy to operate as a tape recorder but offer simple and powerful features. With Trax you can easily correct misplayed notes, cut and paste to repeat a part, or remove a verse and step input. Use Trax for composing your own songs, performance, learning to play or adding soundtracks to multimedia presentations. Sound Management, 800-548-4907.

• **UpBeat.** Get ready to drum and add great percussion. UpBeat software will turn you any Macintosh into a complex and versatile drum machine. Use the mouse or MIDI to input your patterns. Sound Management, 800-548-4907.

• **Oberheim Strummer**. Interactive guitar chord voicing converter. The authentic-sounding guitar for keyboardist who need a guitar player. Connect via MIDI the Strummer between your keyboard and your sound module, play a chord an get ready for a great experience. Sound Management, 800-548-4907.

• **Boss Dr-550 and Dr-660 Dr. Rhythm**. One of the most popular rhythm machines. Features 91, 16-bit sounds including jazz, brushes, ethnic percussion and a variety of sound effects. Sound Management, 800-548-4907.

• **Roland R8 Human Rhythm Composer**. Create incredibly real sounding drum parts with this 44.1 kHz samples, 16 velocity and pressure-sensitive pads. MIDI connections and powerful performance and programmable features. Sound Management, 800-548-4907.

• **Roland GR-50 Guitar Synth**. Use a guitar to solo on a flute, organ, marimba, or drums. This easy-to-use plug and play guitar controller combines the fastest pitch-to-MIDI conversion available with a powerful synthesizer in a single rack unit. Precise tracking of string bends, hammerons, slides, and pull-offs without programming. Play external sound modules and sequencers through the MIDI out port. Wonderful sounds including pianos, trumpets, voices, drums with built-in reverb and digital delays. This system requires the GK-2 Guitar Synth Driver. Sound Management, 800-548-4907.

• **ShowTune**. For flowing MIDI files into standard notation quickly and easily for home and studio recording for the IBM, cost only $79. Thoughtprocessors, 584 Bergen Street, Booklyn, NY 11238, 718-857-2860, Fax: 718-398-8411, or Sound Management, 800-548-4907.

• **Power Chords**. A fun to use, graphic song writing program for the IBM that can create chords on an on-screen guitar or other stringed instrument, use the graphic rhythm editor to quickly create strumming/plucking patterns, drum parts, melodies and bass. Packed with MIDI features, import/export Standard MIDI files and supports GM and sound cards. 604-436-0425 (BC Canada).

• **Super Studio Session**. Even if you never paid attention in music classes, you will be writing music in no time. Uses the Macintosh's sound ability alone or MIDI, entertaining graphics are displayed while music is playing; new features include: printing with beaming, independent track volume control, supportive manual. Instrument disks available for use with Super Studio Session: Brass—trumpets, trombones, French horns; Country—banjos, country and steel guitars, fiddles, harmonicas and jaw harps; Heavy Metal—guitars, drums, keyboards; Sound Effects—animals, machines, common and funny sounds; String Quartet—violins, violas, cellos, basses, pizzicators, and songs from Bach, Debussy, Mosart, Dvorak, and Schubert.; works with Jam Session 2.0 also. 800-548-4907.

• **Cubase**. Industry standard sequencing software for the Macintosh and Atari ST and new release Cubase for IBM Windows by Steinberg. Cubase has an intuitive graphic user interface and makes sequencing fun—right from the start, even allows the new electronic musician a successful recording session.. Software includes Arrangement Windows and the Editors: List editor, Key editor, Drum editor, Logical editor. Cubase for Windows supports: Steinberg MIDI PC1 card, Steinberg SMP II-PC, Steinberg SMP 24 after upgraded, as well as Roland MPU and compatibles, MusicQuest 32M, SoundBlaster Pro, MOTU MIDI Time Piece, Key Electronics MIDIator MS 101/103, and Yamaha TG-100. 800-548-4907.

• **MusicQuest IBM Laptop MIDI Interface**. The manufacturer of the best-selling PC MIDI interface , MusicQuest, has released a serial MIDI interface that will be very compatible with much of the electronic music industry's software, an external MIDI interface for laptop IBM/compatible computers. The external interface will be a very popular alternative to Key Electronic's MIDIator. 800-548-4907.

Chapter Six: Understanding MIDI Musical Devices

UNDERSTANDING MIDI MUSICAL DEVICES

Are you thinking about buying a MIDI keyboard or upgrading? Or maybe a sound module? Or maybe you have read about the music workstations and samplers? Well, here's a few points of information and questions you may want to consider as you shop around! Generally speaking, the cost of a MIDI equipped keyboard can range from, a low-end Casio or Yamaha, for approximately $199-$500 to a high-end Ensoniq, Roland or Korg keyboard that can cost thousands of dollars.

A sound module, in theory, should cost less than a keyboard because you're not paying for the keys and other related hardware, just the desktop box or a rack-mountable unit with the internal electronics, front user controls, and read connection ports. But some of the better sounding modules do range form $500 to $2500. (i.e. Roland Sound Canvas, Korg modules, and the Em-U Proteus.)

To clarify the general categories of MIDI keyboards, the following information will help you understand the terms and labels given to MIDI sound-making devices. Consumer level MIDI-equipped keyboards will have factory preset sounds that can not be changed or altered some contain 100 or more stored instrument sounds and effects. A MIDI-equipped synthesizer has stored sounds and can also generate new sounds by waveform design. A sampling MIDI-equipped board can sample/record and play sounds. A sampler keyboard can be connected to a CD player for recording CD-quality sounds into its memory and then stored for use. A MIDI workstation is an all-in-one keyboard with factory sounds, sequencing, editing, storage capabilities as well as ROM/RAM sound card options and many other features. A MIDI drum machine is in the module form and is design to be connected within a MIDI-based system for programming and producing quality drum patterns for rhythm.

Try to select a MIDI keyboard that you will comfortably grow into and not out of. A MIDI keyboard's operating system that is *too* difficult to learn may not be the best entry for a beginner and may not be fully utilized. At first, for the beginner, purchase a lower-end but great sounding and easier-to-use MIDI keyboard or synthesizer and then grow into more sophisticated and expensive units. Your first MIDI keyboard can always be added to your MIDI system as a slave device. MIDI keyboards, modules, samplers, and synthesizers can be inter-connected and then routed to you computer *(See Chapter Three: MIDI Configurations)*

More expensive keyboards costing over a thousand and into the two thousand dollar range are common in performance and for serious musicians as well as for serious home hobbyist and song composes and in music instruction programs. (A new trend and alternative to an acoustic piano in private piano study are the latest line of the high quality and great sounding digital pianos that are pack with features, a disk drive, expandable memory, and other manufacturer add-ons.

For a live performance keyboard and device, most musicians prefer quality construction, ease of portability, reliability and very often a complete do-it-all music system/keyboard that is all wrapped in one or two instruments. Performing and composing musicians want a large selection and variety of quality sounds with 16-32 polyphony and multitimbrel playing abilities. Musicians who desire sound design and sampling ability need MIDI synthesizers and MIDI samplers with loads of memory and storage. Mutimedia people tend to like sound modules and keyboards that are general MIDI with polyphony and multitimbrel playing abilities for their MIDI files and sound tracks, (Roland JV-30 or JV-80, GM). For the general home environment with elementary children tracking in music/piano lessons they should have the opportunity of *quality touch* including weighted keys that are touch sensitive. Remember that a General MIDI (GM) savvy instrument may be a perfect choice if you are just starting a system.

MIDI KEYBOARD PLANNING & PURCHASING FORMS

- What method of synthesis is used in the keyboard? _____
- How many factory presets are installed; how does each sound? _____
- Is there any waveform memory? _____Is the keyboard GM?_____
- How is tuning and re-tuning the instrument handled? _____
- Are there one or two card slots for RAM/ROM PCM cards/disks? _____
- Is their a built-in hard disk drive system? _____
- How many voices can the device play at one time? _____
- Can the instrument do splits and layers of sounds? _____
- Can the instrument or module be traded up at the music dealer for a more powerful board? _____Trad-in Value _____
- How many keys are there? Are the keys full size or mid size keys? 61 or 76 or 88 keys. _____
- How does the keyboard actually feel—quality of touch? _____
- Are the keys velocity sensitive and weighted? _____
- Is there aftertouch and how is the release action? _____
- How big is the LCD and control panel? _____
- Can you work on it and see it clearly? Does it light up? _____
  (Very important feature for modules and if you wear glasses)
- How many ports on the rear of the device? _____ Is there a port for a control pedal?
- Can the keyboard send and receive effects? ____? Other info? _____
- Can the keyboard/module send and receive standard MIDI data? _____
- Is the device multitimbrel and how many instruments can be heard at a given time?
- What's the list price? _____ What's the street price? _____

• Is the keyboard worth it? _____ Can you justify the cost and it level? _____

•How does it compare to the next upgraded modelmore expensive devices? _____

•What's the average price from several music stores and instrument dealers? _____

• How hard will it be for you to learn and master its features? _____

• Can you purchase a package deal and add some lessons/tutoring? _____

• Is there a third-party support book or easy-to-understand manual? (i.e. Alexander Publishing) Title and Publisher? _____

• Are you over buying for the time and effort you have? _____

• Are there features that you really would not use? _____

• What are 10 requirements for a keyboard that you will enjoy playing? _____

_____

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Notes and other information:

Please Note: First-time buyers can end up over their heads and purchase a high-end device and very seldom use its full capabilities! Remember when you purchased your first VCR, are you using all those features, or are you a RECORD-PLAY-REWIND user?

Below is a general summary of well-known keyboards, modules and other devices for your reference and consideration.

MIDI KEYBOARDS, CONTROLLERS, SAMPLERS, WORKSTATIONS

CASIO: Casio CT-470, Casio CT-655, Casio CT-670, Casio PMP-600, Casio PMP-700, Casio VZ-1.

ENSONIQ: Ensoniq SD-1, Ensoniq SD1, Ensoniq SQ 1, Ensoniq VFX, Ensoniq VFX-SD, Ensoniq 16 Plus, KS-32.

E-MU: E-MU MPS Plus.

KAWAI: Kawai FS610, Kawai FS630, Kawai FS650, Kawai FS680, Kawai KI, Kawai K1-II, Kawai K4, Kawai KC-10, Spectra.

KORG: Korg MI, Korg T1, Korg T2, Korg T3, Korg Wavestation, Korg Wavestation EX, Korg 01/W ProX Music Workstation, Korg 01/W Music Workstation, Korg 01/WFD.

KURZWEIL: Kurzweil Pro 76, Kurzweil K1200, Kurzweil 2000.

PEAVEY: Peavey DPM 3.

RHODES: Rhodes Model 660, Rhodes Model 760.

ROLAND: Roland A-80 master keyboard, Roland D-5, Roland D-10, Roland D-20, Roland D-50, Roland D-70, Roland U-20, Roland JV-30, Roland JV-80, Roland RA-90, Roland JD-800, Roland JX-1, Roland JW 50 Music Workstation, Roland A-30 Master Controller, Roland PC-200 MIDI Controller.

TECHNICS: Technics KN600, Technics KN800.

YAMAHA: Yamaha PSR4600, Yamaha PSR48, Yamaha PSS700, Yamaha SY22, Yamaha SY55, Yamaha 85, Yamaha 35, Yamaha SY77, Yamaha V50, Yamaha X2500.

DIGITAL PIANOS

Roland FP-8, Roland RD-300S Digital S/A, Roland ep-3, Roland ep-5, Roland ep-7.

MODULES

EM-U: EM-U Proteus 1 Rock & Pop, Proteus 1XR, Proteus 2 Orchestra, Proteus 3 World, Em-U Proformance 1 Piano Module, Proformance 1+ Sound Module, EM-U Pro/Cussion.

KAWAI: Kawai K1-RII Module, Kawai K4R.

KORG: Korg 03R/W Synthesis Module, Korg Wavestation A/D Module, Korg M3R.

ROLAND: Roland U220 RS-PCM, Roland Sound Canvas SC-155, Roland Sound Canvas SC-55, Roland SB-55, Sound Brus.

DRUM MACHINES

BOSS: Boss DR-660 Dr. Rhythm, Boss DR-550 MKII Dr. Rhythm.

E-MU: Procussion 16-bit Percussion Module.

KAWAI: XD-5

OBERHEIM: Interactive Drum Pattern Sequencer.

ROLAND: Roland R-70 Human Rhythm Composer, Roland CR-80, Roland R8M.

Selecting A MIDI Keyboard

Today most well-known musical devices are MIDI; but, their are keyboards, synthesizers, and other musical electronic devices that are not MIDI equipped. Keyboards are found in many merchandise, piano/keyboard/music stores as well as catalog/mail order houses. Non-MIDI keyboards are very intelligent in their own right, but are not a MIDI device. Non-MIDI keyboards have such features as: polyphonic or monophonic sound (play one note or several notes at one time), preprogrammed musical rhythms, auto-chord play with one note, sampling ability, multitimbrel, built-in drum kit/s, etc. These keyboards are usually intended for home use and non-MIDI use.

A musical device must be labeled MIDI; to be sure, check the back panel of the device and look for ports labeled MIDI IN, MIDI OUT, and some have MIDI THRU which allows a daisy chain of MIDI devices.

When selecting a keyboard or MIDI device, purchase and set up equipment that has a well-known reputation as indicated in this guide. Don't hesitant to order from companies that are not local; next day or two-day mail is standard shipping practice; use a credit card for convenience and for returning products if necessary.

The well-known manufacturers of Roland, Korg, Kawai, Yamaha etc. equipment offer amazing MIDI keyboards and accessories packed with powerful features: preprogrammed sounds and beats, RAM Sound Cards/ROM cards, additional memory options, and built-in sequencer for track recording options, and even playback of prerecorded music recordings. (Yamaha digital pianos, 3.5 disks).

One of the most important features of a MIDI keyboard is the sound quality or preset factory patches. Do you like most of the sounds it makes? You *should* visit a music keyboard dealer and play with the device for 30 minutes—you will hear and learn alot about it. Ask the salesperson for a full-feature demo of the sounds and features, then compare it to other keyboards that are a little more or less expensive.

The next most important feature is the quality of the keys—the touch and the feel—this can cost! Keyboards for the most part have weighted and unweighted keys and with either 45, 61, 76, or 88 keys. It would be a great bonus to have the full 88 weighted keys but if you can't afford it or do not have the room for a longer keyboard then you should purchase a board that has full-size keys and are touch/velocity-sensitive with the best sounds for your style of music.

When selecting a MIDI keyboard, another option would be to purchase a MIDI master keyboard, called a controller, that makes no sounds, like the Roland A-30 with 76-weighted action response, and then add a sound module like a Proteus 1 or 2 or the Roland Sound Canvas SC-55 or SC-155.. On the plus side of this set up you have many more options for adding and replacing sound, via modules. Your MIDI system could stay flexible and current with new technology providing your willing to go the trade-in route if necessary.

Once you have found and considered the touch quality, price range, and number of keys the next important consideration is whether the device has polyphony and multitimbrel capabilities. In other words what's the magic number of notes the device can play at one time (polyphony) and the number of instruments it can play at one time (multitimbrel capability).

Name brand keyboards to consider should have at least 8-16-note polyphony and can play music on at least 4, 8, or 16 MIDI channels. (Remember that MIDI can sent data on 16 MIDI channels, and if you have a computer-based MIDI system then you can possibly run 32 MIDI channels with the right MIDI interface. (i.e., for IBM MusicQuest MQX-32M or for a Macintosh based 32-MIDI channel system the MIDI Time Piece II or Opcode's Studio Plus 2, 3, 4 or Studio 5 will do.) More powerful instruments offer 32-note polyphony and 16-channel operation. Experienced electronic musicians like to be spoiled with more ability, advanced featuers, multi-channel connection with very advanced workstations and samplers

Finally, there are music composing MIDI workstations. These devices have a quality touch response, a good selection of sounds, 16-32 note and instrument polyphony-multitimbrel and a built-in sequencer for recording, editing, and play back—sometimes call a stand-alone music workstation.

To help you further understand the complexity of MIDI keyboards, synthesizer, modules and other devices, the following will briefly explain several of the more popular devices. Nearly all the devices below are available through Sound Management 800-548-4907.

• **Roland JW 50 Music Workstation.** A complete, stand-alone production music workstation that integrates a sophisticated 16-track sequencer, wide array of built-in sampled sounds (317) and effects, a sixty-one note keyboard with velocity and aftertouch, and extensive compu-mixing capabilities. The Music Workstation is GS standard and has 16-part multitimbrel capability, 24-voice polyphony. The unique Backing function that allows you to create 4-part accompaniments just by picking a music style and the chord progression. List $1995

• **Roland JV 30.** General MIDI, easy-to-use, 61-key, multi-timbral sample-playback synthesizer with a low price. An incredible array of 445 high quality tones, eighteen drum kits and on-board digital effects and 128 programmable tones. The JV-30 has sixteen-part multi-timbral capabilities and twenty-four voice polyphony. Splits, layers, octave-doubling and automatic tone "fattening." List $1195.

• **RolandJV-80.** One of the high end MIDI synthesizers with 4 MB of high-quality multi-samples, expandable to 14MB. Modulation abound with 48 assignments for real-time control per patch. Each patch has up to four tones that are unique to it. Editing is quick and easy with the dedicated buttons and sliders and display. Eight-part multimbral operation and 28 voice polyphony. New voice preserver technology for glitchless patch changes on a single part, even when the first sound hasn't died out, and a new type of tone delay that intelligently follows performance timing. Great master MIDI keyboard that can send MIDI data on eight MIDI channels. List $1895.

• **Roland A-30.** A 76-key MIDI master keyboard with weighted action with excellent response feel and extended range controller. The A-30 has two separate split points and transpose functions. Both lower and upper zones can send their own program changes, volumes, and effect levels. Pitch Bend and sustain pedal can be programmed independently, and the Data Entry slider can send any continuous controller. The Pitch Bend lever can also transmit Aftertouch. 32 user patches, also sends Start, Stop and Tempo messages. This device makes no sounds and must be connected to a sound module or another keyboard. List $795.

• **Roland D-70.** The D-70 Super LA synthesizer features 76 weighted keys with velocity and after touch, 119 RS-PCM waveforms, 128 user Patches/64 Performances, 5 part multitimbral plus drum selection, 30 note polyphony, digital effects, three selectable key modes: Zone, split, and layering. This is the perfect instrument for live performance of a studio musician as it has a 40 digit and 8 line LCD display. List $2595.

• **Roland JD-800.** The Roland JD-800 Programmable Synthesizer features 61-weighted keys with velocity and aftertouch, 108 preset waveforms/64 internal Patches, Envelope Generator and tow independent LFOs per tone and 3-band parametric EQ. Built in multi-effect capability allows up to 7 simultaneous effects including reverb, chorus, delay, enhancer, band pass filtering, phaser, and distortion. Sliders, knobs and buttons are arranged on the front panel to control virtually all sound parameters in real time. The JD-800 is 24-voice polyphony and allows up to four tone layers or six multi-timbral parts in multi mode and uses additional waveforms on LS- and SO-PCM cards.

• **Roland JX-1.** The JX-1 Entry-level performance Synthesizer features 61-velocity sensitive keys with 24 note polyphony, 64 preset sounds with 32 user-

definable Tones, built in digital reverb and chorus, 4 tone sliders allow real-time changes of parameters, PCM sampled sounds with time variant filtering. List Price $895.

• **Roland A-80 Master Keyboard**. The highly professional A-80 master controller, fully-weighted, 88 velocity-sensitive, polyphonic aftertouch has a large 240 x 64 dot backlit LCD with 25 windows, 2 MIDI in's and 4 MIDI out's and 1 MIDI THRU and 12 user-assignable performance controllers. A unique Rotary Oil Damper system gives the true feel of a concert grand piano. In addition, the A-80 has a MIDI panic button, solo, and mute, 64 patches and a SysEx storage feature and can be easily connected to sound modules. List $2750.

• **Roland A-50 MIDI.** Professional master controller that has all the features of A-80 but has 76 weighted and velocity-sensitive keys.
List $2095.

• **Roland PC-200.** A MIDI controller keyboard, featuring 49 polyphonic, velocity-sensitive keys, built-in bender/modulation lever, assignable slider, transposable up/down one octave. Uses batteries or an AC adapter; ideal for computer music applications. List $350.

• **Roland AX-1 Strap-On Keyboard**. A performance-based MIDI keyboard loaded with performance features: 45 velocity-sensitive keys, an Expression Bar that sends both position and pressure, a sustain switch on the neck, splits and layers, sequencer Start/Stop/Continuous Controller messages. When used with the Sound Canvas or other GS modules, you can turn reverb and chorus on and off, ad tones and perform with excellent control. List $795.

• **Roland FP-8 Digital Piano**. The FP-8 Digital piano features 88 keys hammer action mechanism, 28 voices polyphony, 16 sounds with 8 types of chorus and reverb, 4500 note recorder, 4 built-in monitor speakers powered by 2 separate 10 watt amps, stereo out, line in and headphone jacks. List $2695.

• **Roland RD-300S Digital S/a Piano**. The Roland RD-300 S/A Piano features 88 weighted piano action keys, 8 studio quality sounds, built-in chorus and tremolo effects, 2 sliders for sending separate MIDI volume commands per channel, local ON/OFF per zone, and dedicated transpose button. List $2395.

• **Roland EP-7.** The seventy-six (76) weighted-action keyed electronic piano has excellent sound and touch. All the convenience of digital but no tuning necessary. The EP-7 has a private headphone practice jack and requires no setup or programming effort. This digital piano includes built-in speakers and amplifiers and has a simple 1600 note sequencer. Other sounds include the internal piano, electric piano, vibraphone, string, and organ sounds. On the rear panel the keyboard has MIDI ports for connections to a sound module or other keyboard. List $995.

• **Roland EP-5.** The Roland EP-5 digital piano has 61 touch sensitive keys with 24 voice polyphony. Built-in music recorder with 1600 note capacity. Two 5" speakers and headphone jacks, stereo outputs and MIDI IN/OUT. List $675.

• **Roland EP-3.** This 61 keyed digital piano has 24 note polyphony and 5 preset tones, built-in 5 inch speaker with 2 headphone jacks, stereo outputs and MIDI IN/OUT. List $450.

• **Roland Sound Canvas SC-55.** The SC-55 is a 24 note polyphonic sound module with 16 part multitrimbral capability. 315 built-in sounds and 9 drum sets and SFX set which are GS compatible. Sounds are compatible with the MT-32 and CM32L sound modules with matching program change numbers an other MIDI parameters. Includes wireless remote control. This sound module is perfect for use in a multimedia settings. List $795.

• **Roland Sound Canvas SC-155.** The newest General MIDI (GM) sound module by Roland that has sliders/muting buttons with 317 lushly orchestrated sounds for arrangements and can play up to sixteen different parts at once. Perfect for expand-

ing your existing keyboard/MIDI system or main controller keyboard. The Sound Canvas is ideal for home recording and stage performance, and is a perfect match for Roland's SB-55 Sound Brush. SC-155 This sound module is perfect for use in a multimedia settings. List $895.

• **Roland U-220.** This tone module is the rack version of the Roland U-20 keyboard. RS-PCM sound source offers excellent quality sounds; namely the acoustic piano and bass and organs. Features include 30 voice polyphony and 6 multitimbral parts + 1 drum part, 6 individual outputs, a 24 x 2 line LCD display. This system has a 24 bit all digital reverb and chorus effects which can be used simultaneously, 16-bit digital to analog converter using PCM samples for sound quality. List $1095.

• **Roland SB-55 Sound Brush.** This unit is not a module but worthy of documenting because of its amazing ability. The SB-55 Sound Brush is a half-rack sequencer that can play back data recorded in Standard MIDI File specifications. Songs can be ported from any source that meets the Standard File format. The system is like a CD player because the operation lets you play songs one at a time, in a preprogrammed order, or in random selection. Loads next song while the end of the current song is playing, allowing virtually no loading time. It houses a 3.5 inch floppy disk drive can store 99 songs or 90,000 notes. Records on 1 track but can playback up to 17 tracks in MIDI format 1. The Roland SB-55 Sound Brush comes complete with a wireless remote controller. List $695.

• **EM-U Proteus/1.** The Proteus/1 has 192 onboard samples make on the Emulator III. The Proteus /1 has 16-channel, 32 voice 16-bit samples of acoustic and electric instruments such as pianos, organs, strings, brass, guitars, basses, drums, and Latin percussion. The module is for popular or current music. This system is very is to use and is a wonderful addition to a MIDI system. List $995.

• **EM-U Proteus/2.** This sound module uses the same technology as the Proteus/1, but the Proteus/2 is a symphony with 8 MB of realistic orchestra sounds. Solo, ensemble and pizzicato version for each string, great woodwinds, brass, timpani. It has 192 presets, including 64 user presets. List $1495

• **EM-U Proteus/3.** A MIDI sound made with the same technology as the /1 and /2 modules that has high quality sounds world sounds. Image having access to 16-bit, 16-channel, 32 voice polyphony of quality digital world sounds from a oriental string instruments to a Jew's harp to a 30,000 year-old Australian didjeridu. List $795.

• **EM-U Proteus 1XR.** The same sounds as the Proteus 1, but has memory of 384 presents, including 256 user presets. List $1295.

• **EM-U Proteus Orchestral Expander.** An additional 4 MB of orchestral samples for the Proteus 1 or 1X. List $495.

• **EM-U Proteus 2 XR.** Same sounds as the Proteus 2, but with memory for 384 presets, including 256 user presets. List $1195.

• **EM-U Proteus 3 XR.** Same sounds as the Proteus 3, but with memory for 384 presets, including 256 user presets. List $995.

• **EM-U Pro/Cussion.** This high end percussion module has 4 MB of the highest quality 16-bit percussion samples stored in ROM. Use with your sequencer, keyboard or any MIDI controller such as the Roland Pad80, Drum Kat, trigger pads w/ MIDI interface. The 4 MB are arranged into 128 kit locations, 64 of which are user-programmable. List $1095.

• **EM-U Proformance 1 Piano Module.** An amazing module that creates superb stereo piano sounds. These samples have actually been sampled in stereo for real effects. 16-bit stereo samples of 15 different pianos. Selectable MIDI channel, transpose, volume and fine tune controls. Half rack size and is an excellent addition to synthesizer that lacks a quality piano sound or for a music teacher only uses piano sound and has a controller keyboard. List $499.

• **EM-U Proformance 1+.** Similar system to Proformance 1 Piano module but has 15 additional sounds including organs, bells, splits, electric and acoustic pianos, vibes acoustic and electric bass samples and will produce 2 multitimbral sounds. List $599.

• **EM-U Proteus MPS Plus.** The MPS Plus is a 32 voice polyphone, 16-MIDI channel multi-tumbrel operation, 4 polyphonic outputs and the ability to access 500 onboard presets. This system has powerful performance and MIDI control capabilities like Quick Keys and Performance Maps—all with the industry's clearest, most straight-forward user interface. The MPS Plus keyboard comes standard with 8 MB of CD-quality sounds. Excellent grand pianos, screaming electric guitars, and punchy brass. In addition the MPS Plus also has very quality sounding orchestral sounds including solo strings, woodwinds, classical brass and orchestral percussion, in other words, a full symphony. List $1795.

• **Kawai K1-II.** 16 voice digital synthesizer, 61-note weighted keyboard with velocity and pressure sensitivity. 256 soundwaves, digital FX, Multi mode with up to 8 independent sounds with a separate drum section and 16 types of reverb and delay effects. List $895.

• **Kawai K1-RII.** Sound module version of the above synthesizer.
List $695.

• **Kawai K4.** 16-bit digital synthesizer with 61 weighted keys with release velocity and aftertouch pressure. 160 PCM samples and 96 digital cyclic waveforms can be used in additive, subtractive, and ring modulation synthesis. 16 voice polyphony with 8 instrument multitimbral. The Kawai K4 has built-in generator containing 16 different effects stereo, reverb, delay, gate, overdrive, and stereo panning. List $1445.

• **Kawai K4R.** Sound module version of the above synthesizer without stereo panning and depth settings on the effects processor. List $995.

• **Kawai KC10.** 16-bit sound generator with PCM waveforms and 48 digital cyclic waveforms used to create 64 presets and 32 user patches. This synthesizer has 61 velocity sensitive keys with a built-in auto arpeggiator. 10 note polyphony and 4 note drum section can be used in multitimbral operations. List $649.

• **Kawai XS-1.** A 16-bit synthesizer sound module with 128 selectable wave variations created form 16-bit PCM and DC digital cyclic waveforms. The sound module has 16 multi-patch locations that can be used to play up to 4 single patches. Multitimbral mode can produce 4 sounds plus the drum section. List $275.

• **Peavey DPM 3SE Digital Phase Modulation Synthesizer.** Expanded editing functions and 16-bit sampling capabilities, the SE proved that the DPM design for limitless software upgrades is the way to go. Advanced features include doubled sequencer capacity to 40,000 notes, 100 sequences, 20 songs, loopable envelopes, sustain only, sustain plus, release looping, programmable filter settings for each drum in a Drum Kit, Programmable Pan per linked program in COMBI programs, enhanced editing ROM the keyboard of parameters that are note or velocity-based and drum piece selection from the keyboard. This system is packed with powerful performance functions. Call a dealer for pricing.

• **Peavey DPM SP/SX Sampling System.** One of the most affordable and yet powerful full-feature 16-bit sampling system. The DPM SP rack-mount sample playback module offers 16-bit resolution and 44.1 kHz stereo sample playback rate for industry standard sonic quality. The SP is capable of handling up to 32 MB of internal sample memory. The sample RAM is expandable with low-cost industry SIMM chips. The DPM SX Sampling Xpander module allows you to digitally record your own 16-bit samples and send them over SCSI to the SP or in the standard SDS format to the DPM 3 or other compatible instruments. Call a dealer for pricing.

• **Kurzweil K1000 SE and SE II/Extended**. With 24-note polyphony, 16-channel multitimbral capabilities, a no-compromise 76-note weighted keyboard with aftertouch the Kurzweil K1000 SE and SE II/Extended are powerful tools for live performance and recording. Plenty of MIDI control with three separate programmable zones, has 109 factory program including the remarkable Kurzweil grand piano, bass, organ, choir, strings, baritone horn, trumpets, vibes, clarinet, and great selection of synth, layered, and special effects programs. The K1000 SEII/Extended features the addition of the KXA Sound Block with 4.5 MB (175 programs) and adds electric piano, flute, drum kits, percussion, electric bass, synth pads, analog brass, and more. Call a dealer for pricing.

• **Kurzweil 1200 Pro I**. One of the most powerful general purpose expansion modules available. With 24-note polyphony, 16 channel multitimbral operation, and an incredibly broad selection of sounds, the Pro I is ideal for a foundation for a home MIDI studio or for live performance. The Pro I has a full 6 MB of Kurzweil sound ROM including studio grand and rock pianos, acoustic and electric basses, strings, dual-hardness fine electric pianos, flutes, assorted drum kits and percussion, organ, guitars, marimba, brass, tenor sax with synth layers, sweeps, cliff pads, analog leads, and more. Call a dealer for pricing.

• **Kurzweil 1200 Pro II**. For music production and performance requiring a complete selection of true-to-life orchestral sounds the Kurzweil 1200 Pro II features 6 MB of ROM, 20-note polyphony, a new operating system, and a 23-button front panel. Onboard sounds include solo, sections, layers, and other variations of violins, cellos, flutes, French horn, oboe, bassoon, clarinet, trumpets, trumbones, saxophones, timpani, and synth sounds. Call a dealer for pricing.

• **Kurzweil 1200 Pro III**. Designed with today's smaller club and function groups in mind, the 1200 Pro III is the ideal complement for the live musician who already owns a general purpose keyboard. The Pro III offers a complete selection of the most sought after backup instruments—guitars, basses, saxes, brass and hot synth sounds and 20-note polyphony. The Pro III has 6 MB of ROM giving you nylon and steel acoustic guitars; hollow-body and solid electric basses, baritone, alto, tenor and soprano sax, trumpets and trombones, and great synth sounds. Call a dealer for pricing.

• **Kurzweil K2000**. The grand daddy of MIDI keyboards. At one new sound per second, 24 hours a day, it would take over 300 years to outgrow the K2000. No programming is necessary to enjoy the K2000's vast stockpile of 8 MB worth of striking new 16-bit sound files. Beyond this the K2000 can accept MIDI sample dump files from other machines or sample your own and there is also a multi-effects processor that can produce up to four simultaneous effects. A 61-note velocity/aftertouch sensitive keyboard with master controller features, a bit 240 x 64 backlit graphic display for programming. Other features include: 32-bit internal precision, into 18-bit output DACs, 4 SIMM sockets for user sample RAM up to 64 MB, up to 3 configurable filters or effects per voice movable in real time, 6 polyphonic audio outputs, configured as 4 separate outs and a stereo master pair. In addition there is room over 100 user-created sounds, sends on 3 MIDI channels, 24 voice polyphony, up to 4 oscillators per voice for fat timbres, 16-multitimbrals, 3.5", 1.4 M DOS-compatible disk drive, SCSI support port for connection to a hard disk drive and optical media (CD ROM), and optional audio input board for stereo sampling of analog or direct digital sources (R-DAT.) Call a dealer for pricing.

• **Ensoniq EPS-16 Plus Digital Sampling Workstation**. The EPS-16 Plus is available as a 76-key keyboard or a rack-mount unit. An incredible library of 1000 sounds that have been developed by the pros. Both feature 16-bit fidelity, 24-bit dynamic effects, and a 16-track sequencer with recording and editing features geared towards musicians. Both are available in Turbo configurations with expanded RAM, our FLASHBANK memory, and SCSI interface to give you all the power and versatility you need. Call a dealer for pricing. 800-553-5151.

• **Ensoniq SD-1 Music Production Synthesizer.** Top of the line, 32-voice polyphony integrated sequencing performance keyboard with an easy-to-use interface. The SD-1 has advanced synthesis, 16-bit output circuitry, 24-bit dynamic effects, and 24-track sequencer. Call a dealer for a price. Call a dealer for pricing. 800-553-5151.

• **Ensoniq SQ-1 Plus or the SQ-R Plus.** A personal music studio offer a complete range of musical possibilities to a buget-conscious musician. The SQ-R Plus is a rank mount version of the SQ-1 Plus keyboard. Advanced synthesis, 24-bit dynamic effects, and a 16-track sequencer and 21-voice polyphony. Call a dealer for pricing. 800-553-5151.

• **Ensoniq SQ-2 Personal Music Studio.** A 76-key synth with professional sounds, 24-bit dynamic effects, and a 16-track sequencer, 24-bit dynamic effects, and 21-voice polyphony. Call a dealer for pricing. 800-553-5151.

• **Ensoniq KS-32.** The Ensoniq KS-32 is a weighted action MIDI studio with 76-keys that have pressure sensitivity and dynamic response and 32-note polyphony. The 180 internal sounds cover a variety of piano, electric piano and organ styles, orchestral, solo wind instruments, pop sounds, 20 dedicated General MIDI drum kits and a 16-track sequencer.
Call a dealer for pricing. 800-553-5151.

• **Fatar Studio 90.** An entry-level controller perfect for incorporating a real piano feel in a MIDI rig. Fatar MIDI keyboard controllers have 88-note full size keys with weighted hammer action and escapement; a real piano feel. Call a dealer for pricing. 800-431-6699.

• **Fatar Studio 90 PLUS.** Excellent for the entry level MIDI musician for MIDI control without complicated programming but powerful enough for pros and semi-pros. Fatar MIDI keyboard controllers have 88-note full size keys with weighted hammer action and escapement; a real piano feel. Call a dealer for pricing. 800-431-6699.

• **Fatar Studio 2001.** The flagship of the Fatar line. Powerful and versatile, it is designed for fast, efficient musical control over any MIDI system for the pro and semi-pro. Fatar MIDI keyboard controllers have 88-note full size keys with weighted hammer action and escapement; a real piano feel. Call a dealer for pricing. 800-431-6699.

• **Korg 01/W Pro X Music WorkStation.** This power house is an 88 note-weighted action keyboard with 16 voice, 32 oscillator, AL Synthesis sound source, 80 MB PCM waveform memory. 256 multisound and 129 drum sounds. The Pro X Music WorkStation has a complete digital effects section with a 16-track sequencer featuring 10 songs. Floppy drive 3.5" for sequencer, programs, drum kits, global parameters and other MIDI data functions. List $4999.

• **Korg 01/W Pro Music WorkStation.** Another power house with 76- note unweighted keyboard, 16 voice, 32 oscillator, AL synthesizer sound source. This system has 80 MB PCM waveform memory, 256 multisound and 129 drum sounds, digital effects section, 16-track sequencer section featuring 10 songs, and 100 pattern memory. The 01/W Pro Music Workstation has a built-in 3.5" disk drive for sequencing, programs, drum kits, global parameters and other MIDI data functions. List $3599.

• **Korg 01/W Keyboard.** The 01/W is a 61-note keyboard with 32 voices. The system uses Non Linear Synthesis (Waveshapping) 200 instantly accessible programs and combination sounds on board. Also the 01W has a 16-track sequencer with dynamic digital multi-effects. List $2395.

• **Korg 01R/W Music WorkStation.** Two-rack space unit, same as the Korg 01/W Keyboard but is the module version including slots for PCM data and program/sequence data cards. List $2299.

• **Korg 01/W FD Keyboard.** This model will be a big bang for your dollar. The 01/W has a 61 note keyboard, loads of memory, great effects, handy programming utilities and a superior sequencer. Out of the box the Korg 01W/FD has 255 high end

PCM sounds and 119 drum sounds, a 16-tracks sequencer. Cards can hold additional PCM sounds. 32-voice polyphony for sequences and thick-sounding chords, 16-channel multitimbral operations, 200 program/200 combination memory and comes complete with a 3.5" disk drive. List $2799.

• **Korg Wavestation**. This system houses Advanced Vector Synthesis and is pack into this 61-note velocity and aftertouch keyboard. Use the keyboard's joystick to control over the mix of any four sounds in real time, or program a mix envelope. Unique Wave Sequencing allow chaining of up to 256 basic waveforms to create sounds that are truly distinctive. Flexible modulation matrix with 13 modulation sources, including 2 LFOs, aftertouch, velocity, and mod wheel. Choose up to 6 simultaneous outstanding digital effects from a palette of 46 and use 365 sounds that are packed in PCM-ROM with 32 voice polyphony and use card slots for PCM and program data. List $2399.

• **Korg Wavestation EX**. Powerful, supercharged 61-note keyboard packed with 515 sounds in PCM-ROM, including a long rich piano to primordial drums. Use a joystick to vary the mix ratio of any four sounds in real time, or program a mix ratio envelope. Wave Sequencing lets you chain and loop up to 256 basic waveforms. Each sound can be so deep and complex and the interface is clear, logical and easy to use. The Korg Wavestation EX has 13 modulation sources, including 2 LFOs per voice, aftertouch, key velocity, and mod wheel, including 46 pro-quality effects that can use 6 at once. This system has 32 voice polyphony, pitchwheel, card slots for PCM and program data and much more. List $2335.

• **Korg Wavestation A/D**. A new synth module more advanced than the wavestation keyboard, has an additional 150 waveforms, for a total of 515. Unique external audio processing capabilities allows you to input any external stereo or mono sound source for additional waveforms for the synthesis engines, packed with professional advanced features.
List $2499.

• **Korg M-1**. The Korg M-1 is one of the best selling keyboards. Featuring 61-note keyboard and Al Synthesis the sounds are unique. This board offers 16-voice, 16 oscillator (single mode) or 8-voice, 16 oscillator (double mode) operation. It has a program memory capacity of 100 programs and a combination memory capacity of 100. Digital multi-effects, plus many new cards are available to add new sounds. The keyboard is touch sensitive with aftertouch, has a 8-track sequencer, features 10 song, 100 pattern memory and up to 7700 note (15,400 event) capacity. A very powerful MIDI workstation and performance board. List $2169.

• **Korg M3R Music Sound Station**. This single rack space unit has a built in multi-digital effects processor and uses AL synthesis with 16 voice, 16 oscillator tone generator. The M3R utilizes four separate sound sources: multi-sampled instruments, attack transients, drum sounds and DWGS-synthesized wavefoms. The Sound Station can operate in combination mode and has RAM and ROM card slots.
Call a dealer for pricing.

• **Korg 03R/W AI^2 Synthesis Module**. A single rack module with the great sounds of the Korg 01/W series. The 255 programmed multi-sounds and 114 drum samples give you reproductions of acoustic instruments are impeccable in their realism. Also the is RAM space for another 100 programs, 100 combinations, and 2 drum kits, plus slots for adding more PCM samples and preprogrammed sounds. The system support General MIDI for easy playback for commercial sequences. List $1299.

• **Yamaha SY85**. A synthesizer, quick edit and sound you can imagine. Some features include: the ability to layer, split, cross fade up to four voices, eight control sliders for parameters or use in real time for effects, filters, attack, release and balance. Call 800—932-0001 ext. 100 for more information.

• **Yamaha PSR-SQ16**. 269 automatic accompaniments, an on-board 16-track sequencer and a 61-note, touch-response keyboard. This device can

play accompaniments with choice of variations, introductions, fills, and endings. This powerful keyboard has a disk drive, extensive MIDI capability and superior sound and user play-ability. Call 800—932-0001 ext. 300 for more information.

• **Yamaha SY 35.** This keyboard has a unique sound source, Vector Synthesis. Hands-on control of two types of sound. With a touch of the Dynamic Vector controller you can mix, stir, warp, and blend as many as four different voices at once. Contains sampled live sounds (128) from pianos and strings to tight brass as well as 256 synthesized waveforms, and MIDI capabilities for an easy edit mode with an ultra-sensitive keyboard. Call 800—932-0001 ext. 200 for more information.

• **Wersi Z-One Masterboard.** A MIDI keyboard controller with 88-note, weighted, free-swinging hammer action keys with velocity and channel aftertouch-sensitive with four merging MIDI Ins and four independent MIDI Outs, eight separate zones that can be defined and each of the four sliders and two wheels can be programmed, it can hold 64 user presets, and has a RAM card slot, includes a footswitch. List. $2799. Call 615-871-4500.

Sound Management is a reseller for most manufacturers of MIDI keyboards. Call 800-548-4907.

Chapter Seven: Resources for Development & Purchasing

Computer Add-ons, MIDI Hardware and Software Manufacturers
MIDI Equipment, Instrument, Manufacturers and Suppliers
MIDI Videos, Consulting and Periodicals
MIDI Associations and Telecommunications
Book List
Magazine Article List

RESOURCES FOR DEVELOPMENT & PURCHASING

This section is a comprehensive listing of the leading developers and manufacturers, professional resources, and other support information for your continued development. Request a current catalog form the companies below so that you may obtain up-to-date information. *(Business and telephone numbers are subject to change without notice.)*

COMPUTER ADD-ON'S, MIDI HARDWARE, AND SOFTWARE MANUFACTURERS

(See Music Education Software and Resources for educational developers and MIDI Innovations and Product Descriptions for additional resources.)

AD LIB. 220 Grande-Alle East, Suite 850, Quebec, QC, Canada, G1R 2J1. (800) 463-2686. Simple and versatile music card; an industry standard for music enhanced games.

ALL BREVE MUSIC SOFTWARE. Suite 111, 1105 Chicago Avenue, Oak Park, IL 60302. Call 708-524-9441 or 800-833-2397. A manufacturer of music notation software for the IBM, Musicad.

ALTECH SYSTEMS. 122 Faries Indl. Park Drive, Shreveport, LA 71106. Call 318-868-8036. A manufacturer of Mac/GS MIDI interface and other related products.

BEBOP SYSTEMS. P.O. Box 550363, Dallas, TX 75355-0363. Call 214-320-2723 or 800-775-5557. A developer of a MS-Dos sequencing software with power-user features call LimeLight.

BIG NOISE SOFTWARE, INC. P.O. Box 23740, Jacksonville, FL 32241. Call 904-730-0754. A manufacturer of MIDI sequencing, Cadenza/Windows and editor/librarian software for the IBM.

BLUE RIBBON SOUNDWORKS. 1293 Briardale, NE, Atlanta, GA 30306. Call 404-377—1514, FAX: 404-377-2277. The manufacturer of Bars and Pipes Pro Notation software for the Amiga.

BOGAS PRODUCTIONS. 751 Laurel Street, Suite 213, San Carlos, CA 94070. Call 415-592-5129. The producers of Super Studio Session and Jam Session 2.0 for the Macintosh.

BROWN-WAUGH PUBLISHING. 130-D Knowles Drivem Los Gatos, CA 95030. 800-451-0900. Original manufacturers of Sound Blaster, same type of music as AdLib, first popular card to offer both music and digitized output supported by most sound-enhanced games. Sound Blaster Pro, Full-featured stereo music, MIDI, and speech card conforms to MPC standard and bundled with Tandy's MPC line.

C-LAB. Call 800-553-5151 for a dealer near your location. A leading developer of Atari ST and Macintosh sequencing and notation, software.

CODA MUSIC SOFTWARE. 1401 E. 79th Street, Minneapolis, MN 55425. Call 612-854-1288, Fax: 612-854-4631. A developer of notation software for the IBM and Macintosh computers.

COVOX. 675 Conger Street, Eugene, Oregon 97402, 503-342-1271. Manufacturer of add-on cards for the IBM/compatibles. **The Speech Thing,** Older, special-purpose speech card; **Sound Master II,** Not as well-supported as other options but very versatile; compatible with AdLib music.

COOL SHOES SOFTWARE. 116 Churchland Drive, Winston-Salem, NC 27101. Call 919-722-0830. The developer of Drummer that adds drum patterns to Cakewalk sequencing software by Twelve Tone.

COMPUTER MUSIC SUPPLY. 382 North Lemon Avenue, Walnut, CA 911789. Call 800-322-MIDI or 714-594-5051. A developer of inexpensive 401-compatible IBM MIDI interface, CMS 444 and software, E-Z MIDI Pro.

DIGIDESIGN. 1360 Willow Road #101, Menlo Park, CA 94025. Call 415-688-0600 or 800-333-2137. A leader in the development of software and digital electronics for the Macintosh.

DIGISPEECH. 550 Main St., Suite J, Placerville, CA 95667, 916-621-1787, Manufacturer of Audio Adapter that offers high-quality compressed speech; sold at educator's discount under IBM vendor logo; backward compatibility with IBM Speech Adapter, which it replaced.

DIGITAL MUSIC SERVICES. 23010 Lake Forest Drive, Suite D334, Laguna Hills, CA 92653. The developer of Macintosh editors for the Yamaha TX81Z and other related products.

DR. T'S MUSIC SOFTWARE. 124 Crescent Road, Needham, MA 02194. Call 617-455-1454. A developer of MIDI sequencers, KCS, Beyond, notation, QuickScore, The Copyist, editor/librarians—
X-OR, interface devices, and other related products for the IBM, Amiga, Apple II, Com 64/128, Atari and Macintosh computers.

DYNAWARE. 1163 Chess Drive, Suite J, Foster City, CA 94404. Call 415-349-5700, FAX: 415-349-5879. A manufacturer of IBM professional sequencing and notation scoring software.

ELECTRONIC ARTS. Call Sound Management 800-548-4907. Electronic Arts is the developer of Deluxe Music construction Set for the Macintosh.

ELECTRONIC COURSEWARE SYSTEMS (ECS). 1210 Drive, Champaign, IL. Call 217-359-7099. A major music education MIDI and nonMIDI software developer.

FIVE PIN PRESS. P.O. Box 550363, Dallas, TX 75355-0363. Call 800-726-6434, Support 214-328-1092. Developers of two software packages: 200 instant drum patterns and 260 instant drum patterns. Works with any software sequencer that uses Standard MIDI File format for the IBM, Macintosh and Atari.

HIP SOFTWARE. 117 Harvard Street #3, Cambridge, MA 02139. Call 617-661-2HIP. The developer of Harmony Grid for nonMIDI musicians.

HOWLING DOG SYSTEMS. Box 80405, Burnaby, BC, Canada V5H 3X6. Call 604-436-0420, FAX: 604-436-0425, CIS: 70044, 2736. The developer of PowerChords, an IBM on-screen guitar chord/strumming/plucking pattern MIDI program.

HYBRID ARTS, INC. 8522 National Blvd., Culver City, CA 90232. Call 213-841-0340, FAX: 213-841-0348. The developer of GenEdit for the Atari and Macintosh a universal MIDI editor, organizer and controller.

HYPERMIDI. 21213-B Hawthorne Blvd., Suite 5305, Torrance, CA 90509-2881. Call 310-316-2939, FAX: 310-540-8459. Powerful Macintosh MIDI programming made easy with HyperMIDI.

INTELLIGENT MUSIC. 116 North Lake Avenue, Albany, NY 12206. Call 518-434-4110, FAX: 518-434-0308. The developer of AI based software: OvalTune, UpBeat, JamFactory, RealTime, M.

INTERVAL MUSIC SYSTEMS. 12335 Santa Monica Blvd. #244, Los Angeles, CA 90025. Call 213-478-3956, FAX: 213-478-5791. Developer of MIDI Universal Wavefrom Editor for the Atari and Kawai K-4 editor/librarian software for the Atari and Macintosh.

KEY ELECTRONICS, INC. 7515 Chapel Avenue, Fort Worth, TX 76116. Call 800-533-6434, FAX: 817-560-9745. Manufacturers external MIDI serial interfaces, MIDIator, for the IBM Laptops.

LINDSAY B. HOUGH. P.O. Box 212, Slingerland, NY 12159. A developer of Apple IIGS MIDI utility software, MIDIMate and SysEXGS.

MAGNETIC MUSIC. 647 W. Orange Grove, Pomona, CA 91768. Call 714-865-0407. A developer of Prisim, IBM sequencing software and Texture.

MARK OF THE UNICORN. 222 Third Street, Cambridge, MA 02142. Call 617-576-2760, FAX: 617-576-3609. A leader in Macintosh MIDI software, hardware, and digital MIDI systems, Performer.

MEDIAVISION. 47221 Fremont Blvd., Fremont, CA 94538. Call 800-348-7116, FAX: 415-770-8648. The manufacturer of Pro AudioSpectrum, add-on symphonic stereo card for the IBM.

MIBAC MUSIC SOFTWARE, INC. P.O. Box 468, Northfield, MN 55057. Call 507-645-5851. A developer of music educational and jazz software for the Macintosh, Mibac Jazz.

MICRO TECHNOLOGY UNLIMITED. 156 wind Chime Court, Raleigh, NC 27619-1061. Call 919-870-0344, FAX: 919-870-7163. A manufacturer of hard disk recording on the PC/AT.

MIDICONCEPTS. 2253 Chesterton Street, Simi Valley, CA 93063. Call 805-582 1591. A MIDI software sequencer developer for the IBM.

MIDIMAN. 30 North Raymond Avenue, Suite 505, Pasadena, CA 91103. Call 818-449-8838 or 800-969-6434. A manufacturer of MIDI sync SMPTE boxes SyncMan).

MIDIMOUSE MUSIC. P.O. Box 877, Welches, OR 97067. Call 503-622-4034. The developers of educational software: NoteWizard, ScaleMaster, ChordMagic.

MUSICATOR. P.O. Box 410039, San Francisco, CA 94141. Call 916-756-9807. A manufacturer of IBM MIDI notation software, Musicator.

MUSICQUEST. 1700 Alma Drive, Suite 330, Plano, TX 75075. Call 214-881-7408 or FAX: 214-422-7094. A leader in the manufacturing of MIDI IBM interfaces, PC MIDI Card, MQX-32-M and Laptop MIDI interfaces.

MYSTIC SOFTWARE. Alameda, CA. 510-865-9189, FAX: 510-865-9563, BBS: 510-865-3856 The manufacturers of MusicWorks MIDI sequencing software for the IBM.

OPCODE SYSTEMS, INC. 3950 Fabian Way, Palo Alto, CA 94303. Call 415-856-3333, FAX: 415-856-3332. The developer of Vision software and a leader in Macintosh MIDI sequencing software and interface hardware and other related products.

PASSPORT DESIGNS. 100 Stone Pine Road, Half Moon Bay, CA 94109. Call 415-726-0280, FAX: 415-726-2254. The developer of MasterTracks Pro and Encore a leader in development of Macintosh, IBM/Compatible MIDI software and hardware.

PG MUSIC, INC. 111-266 Elmwood Avenue, Buffalo, NY 14222. Call 800-268-6272 or 416-528-2368. The developer of Band-in-a-Box, automatic accompaniment (AI) software for the IBM, Mac, and Atari computers.

PINNACLE RESEARCH. 4725 e. Sunrise Dr. #435, Tucson, AZ 85718. Call 602-529 1135. A developer of MIDI graphical sequencing software for the NeXT computer.

PIXEL PUBLISHING. 641 Caledonia Road, Toronto, Ontario, Canada, M6E 4V8. Call 416-785-3036, FAX: 416-785-6416. The developer of SuperLibrarian a universal librarian for the IBM, Mac, and Atari computers.

PRIMERA. 650 Cragmont Avenue, Berkeley, CA 94708. Call 415-525-3000. The developer of the Different Drummer for the Macintosh.

PYWARE/PYGRAPHICS. P.O. Box 639, Grapevine, TX 76051. Call 800-222-7536. A leader in band charting aid, MIDI notation software

(MusicWriter) and other related educational products for the Apple IIe, GS, Macintosh and IBM.

ROLAND CORP. 7200 Dominion Circle, Los Angeles, CA 90040, 213-685-5141
LAPC-1 Sound Card, Professional-quality, multi-feature music card with full MIDI support; supports sampled synthesis.

ROMEO MUSIC. 214 Lincoln Street, #104, Allston, MA 02134. Call 617-254-9109, 800-852-2122, FAX: 617-254-9170. Developer of Macintosh, IBM, Atari, Amiga classical concert series MIDI files on disk in General MIDI format, also jazz, folk, pop, and other.

SIX STRING SOFTWARE. P.O. Box 6608, Kent, WA 98064-6608. Call 206-631-5855. The developer of ChordWorks for the guitar.

SONGWRIGHT SOFTWARE. 7 Loudoun Street, S.E. Leesburg, VA 22075. Call 703-777-7232. The developer of SongWright notation software for the IBM.

SOUND MANAGEMENT, ELECTRONIC MUSIC PRODUCTS. Mail Order, knowledgeable, competitive pricing, major contact for any music software. P.O. Box 3053, Peabody, MA 01961. Call 800-548-4907 or Fax: 508-532-6106.

STEINBERG. 17700 Raymer Street, Suite 1001, Northridge, CA 91325.
Call 818-993-4091, FAX: 818-701-7452. The developer of the industry standard—Cubase sequencing software for the Atari, Macintosh, and Windows version for the IBM.

STREET ELECTRONICS. 6420 Via Real, Carpenteria, CA 93013, 805-684-4593
Speech card for MS-DOS; part of a popular line that includes Apple II cards; compatible with older Echo PC+ and IBM Speech Adapter.

TEACHSERVICES. 182 Donivan Road, Brushton, NY 12916. Call 800-367-1844, FAX: 518-358-3028. The developer of notation software, Laser Music Processor for the IBM.

TEMPORAL ACUITY PRODUCTS, INC. 300-120th N.E., Bldg. 1 Bellevue, WA 98005. Call 800-426-2673 or 206-462-1007. A leading developer of IBM MIDI notation, MusicPrinter Plus, software, and educational music software.

THE SOFTWARE TOOLWORKS. 60 Leveroni Court, Novato, CA 94949. Call 415-883-3000. The developer of the Miracle Piano Teaching System for the IBM, Macintosh, or Nintendo systems.

THINKWARE. 130 9th Street, #303, San Francisco, CA 94103. Call 415-255-2091. *Distributor* of MIDI software and support products.

THOUGHTPROCESSORS. 584 Bergen Street, Brooklyn, NY 11238. The developer of ShowTune, The Note Processor, and Triple Forte for the IBM.

TURTLE BEACH SOFTWORKS. P.O. Box 5074, York, PA 17405. Call 717-843-6916 or FAX: 717-854-8319. A manufacturer of MIDI software and disk recording systems.

TWELVE TONE SYSTEMS. P.O. Box 760, Watertown, MA 02272. Call 800-234-1171 or 617-926-2480, FAX: 617-924-6657. A leader in development of IBM sequencing software, Cakewalk.

VOYETRA. 333 Fifth Avenue, Pelham, NY 10803. Call 914-738-4500, FAX: 914-738-6946 or 800-233-9377. A leader manufacturer of MIDI interfaces and sequencing software, V22-M and Sequencer Plus Gold.

WALT DISNEY COMPUTER SOFTWARE. 500 S. Buena Vista, Burbank, CA 91521, 800-688-1520. Developed new lines children software that are sound enhanced.

Additional Software Developers:
AUDIO LIGHT. Developers of Music Studio 88 for the Atari.
BOGAS PRODUCTIONS. Developers of Studio Session for the Macintosh.
BOURBAKI SOFTWARE. Developers of Fractunes, Fractools, Fraczooms for IBM.
E.C.E. Developers of Amiga MIDI interfaces.

EDUCATION SOFTWARE CONSULTANTS. Developers of the Basic Composer-IBM.
GOLDEN HAWK. Developers of Amiga MIDI interfaces.
GREATWAVE SOFTWARE. Developers of Concertware+ MIDI and Kids Time-Mac/GS.
HOTZ INSTRUMENTS TECHNOLOGY. Developer Hotz MIDI Translator for Atari.
JIM MILLER. Developer of the Personal Composer for the IBM.
MICROILLUSTIONS. Developer of MusicX and Music X Jr. for the Amiga.
SCORPION SYSTEMS. Developer of Sybil for the IBM, Mac, and Atari.
STEP AHEAD. Developer of the Tracker for the Atari.

MIDI EQUIPMENT, INSTRUMENT, MANUFACTURES and SUPPLIERS.

ALESIS CORPORATION. A manufacturer of MIDI effects machines and other studio electronics. Alesis Studio Electronics, 3630 Holdrege Avenue, Los Angeles, CA 90016. Call 213-467-8000 for product information.

BROSS PRODUCTS. A manufacturer of MIDI guitar products. Bross Products, 7200 Dominion Circle, Los Angeles, CA 90040. Call 213-685-5141 for product details.

CASIO, INC. A manufacturer of MIDI and nonMIDI keyboards, synthesizers, and other MIDI devices. Professional Music Products Division, 15 Gardner Road, Fairfield, NJ 07006 and Casio, Inc. 570 Mt. Pleasant Avenue, Dover NJ 07801. Call 201-361-5400 for product information and nearest dealer.

CASTALIA PUBLICTIONS. A publisher of MIDI posters and educational aids. P.O. Box 2503, Petaluma, CA 94953.

DAT AUDIO GALLERY. A major supplier of Sony digital audio tape machines. 2717 Wilshire Blvd., Santa Monica, CA 90403. Call 213-829-3429, FAX: 213-829-0304.

DOD. Manufacturer of 16 channel stereo mixers. A Harman International Company, DOD Electronics, Corp. 5639 South Riley Lane, Salt Lake City, UT 84107. Call 801-268-8400.

DDRUM. A manufacturer of acoustic drum triggering systems. ddrum, P.O. Box
166, 25 Lindeman Drive, Trumbull, CT 06611. Call 203-374-0020.

DRUM WORKSHOP. A manufacturer of acoustic drum triggering systems. Drum Workshop, 26907 Lavery Ct., Unit 16, Newbury Park, CA 91320. Call 805-499-6863.

ELECTRO-VOICE, INC. A manufacturer of wireless performance microphone
systems. 600 Cecil Street, Buchanan, MI 49107. Call 800-234-6831 or 616-695-6831.

E-MU. A leading manufacturer of MID sound modules and keyboards. P.O. Box
660015, Scotts Valley, CA 95067-0015.

ENSONIQ CORPORATION. A manufacturer of MIDI keyboards and samplers.
155 Great Valley Parkway Malvern, PA 19355. Call 215-647-3930 for product information.

EVENTIDE. A manufacturer of effects processors. Eventide, 1 Alsan Way, Little Ferry, NJ 07643. Call 201-641-1200.

EYE & I PRODUCTIONS. A producer of RAM cards with sounds for the Roland,
Akai, Ensoniq. Voice Crystal, 930 Jungfrau Court, Milpitas, CA 95035. Call
408-945-0139.

FOSTEX. Leading manufactures of multi-track recorders for the music industries. 15431 Blackburn Avenue, Norwalk, CA 90650, Call 213-921-1112.

GIBSON (DISTRIBUTOR FOR WERSI MIDI KEYBOARD CONTROLLERS. 1818 Elm Hill Pike, Nashville, TN 37210, Call 615-871-4500.

G2DESIGN WORKS. MIDI control for lights, motors, displays, tape machines, projectors, valves/ relays316 Clinton Avenue, Brooklyn, NY 11205. Call 718-636-9535, FAX: 516-367-9301.

INVISIBLE PRODUCTS CORPORATION. A manufacturer of high quality, light weight keyboard stands and other related products. P.O. Box 350, Newtonville, MA 02169-0350.

KAWAI AMERICA CORPORATION. A manufacturer of all keyboards and other MIDI devices. Department EM, 2055 East University Drive, Compton, CA 90224-9045. Call 213-631-1771 for product information.

KEY ELECTRONICS, INC. A manufacturer of external serial MIDI interfaces for Laptop IBM/ compatibles. 7515 Chapel Avenue, Fort Worth, TX 76116. Call 800-533-6434 or FAX: 817-560-9745.

KORG USA. A manufacturer of many MIDI instruments and other MIDI products. 89 Frost Street, Westbury, NJ 11590. Call 800-645-3188 for product information.

KURZWEIL. A manufacturer of outstanding MIDI keyboards. 13336 Alondra Blvd. Cerritos, CA 90701.

LEXICON, INC. A manufacturer of high quality studio engineering equipment. 100 Beaver Street, Waltham, MA 02154-8425. Call 617-736-0300, FAX: 617-891-0340.

MUSIC INDUSTRIES CORP. A distributor of Fatar MIDI controllers. 99 Tulip Avenue, Floral Park, New York, 11001. Call 516-352-4110, FAX: 516-352-0754.

OBERHEIM. A manufacturer of many MIDI instruments and MIDI products. 2015 Davie Avenue, Commerce, CA 90040. Call 213-725-7870.

OPCODE SYSTEMS INC. A manufacturer of MIDI software, interfaces and other MIDI products. 3950 Fabian Way, Palo Alto, CA 94303. Call 415-369-8131, FAX: 415-369-1747 for info.

PASSPORT DESIGNS, INC. A manufacturer of MIDI interfaces for most computers. 100 Stone Pine Road, Half Moon Bay, CA 94019. Call 415-726-0280, Fax: 415-726-2254 for product information.

PEAVEY ELECTRONICS CORPORATION. A manufacturer of professional MIDI keyboards, sampling devices, and modules. 711 A Street, Meridian, MS 39301. Call 601-483-5365, Fax: 601-484-4278.

ROLAND CORPORATION/US. A manufacturer of MIDI instruments and other MIDI products. 7200 Dominion Circle, Los Angeles, CA 90040. Call 213-685-5141 for complete product information.

SENTECH ELECTRONIC INC. (THE OLD SONUS COMPANY).
A producer of MIDI interface hardware for the Apple II and Commodore 64/128. 21416-1 Chase Street, Canoga Park, CA 91304. Call 818-709-4020 or Sound Management, 800-548-4907 for product information orders/information.

STANDTASTIC. A manufacturer of keyboard stands and wall mount kits. 1325 Meridian Street, Anderson, IN 46016. A leading manufacturer of keyboard stands and wall mount kits.

TASCAM. A leading manufacturer of multitrack recording devices. TEAC America, Inc. 7733 Telegraph Road, Montebello, CA 90640. Call 213-726-0303.

TECHNICS. A producer of electronic digital/ MIDI keyboards. Call 800-424-7669 for the nearest dealer.

YAMAHA INTERNATIONAL CORPORATION. A manufacturer of electronic products,

MIDI instruments, and music lab equipment. Digital Music Instrument Division, P.O. Box 6600, Buena Park, CA 90622. Call 714-522-9011 for product information.

MIDI VIDEOS, CONSULTING, AND PERIODICALS

LEARN CAKEWALK QUICKLY VIDEO. This video walks you through the manual step-by-step so you can see how to do it! Available in English, Spanish, French. $29.95 + $3.50. Multimedia International, P.O. Box 260786, Tampa, FL 33685. Telephone: 813-889-9198

MIDI MADE EASY VIDEO. (VHS, $60), offers a fifty-five minute demonstration and explanation of MIDI theory and equipment. (Available through Musication).

SECRETS OF ANALOG AND DIGITAL SYNTHESIS VIDEO. Visual demonstrations for performance and sound design on synthesizers. Sound Management, 800-548-4907.

STEVE POCARO'S VIDEO. (VHS, $44.95), tour a professional MIDI setup and watch how its done by a the recording artists. Sound Management, 800-548-4907.

MACINTOSH, MIDI, & MUSIC VIDEO. $9.95, *Limited availability.* Macintosh Music Video, P.O. Box 8240, Beaverton, OR 97076. Call 800-538-9696, ext. 850.

HANDS ACROSS THE BOARD VIDEO. By Emmett Chapman, Stick Enterprises, 8320 Yucca Trail, Los Angeles, CA 90046. Call 213-656-6878 for details.
Specific VHS video tapes are available for learning/lessons with leading musicians in the field: guitar, bass, keyboards, drums, MIDI, etc.
Call Sound Management 800-548-4907.

ARRANGING AND RECORDING FOR ELECTRONIC KEYBOARDS. By Vinnie Martucci. Learn, create, improvise, program, arrange, record, and improve; six, one-hour instructional tapes plus book, $69. Send for catalog, complete listing of hundreds of instructional tapes. Call 800-33-TAPES. Send for information: Homespun Tapes, LTD., Box 694EM, Woodstock, NY 12498.

THE BASICS OF MAC SOUND AND SAMPLING. INFO/tek. You will learn how to manipulate sound and record sounds with you Mac using SampleCell and AudioMedia cards, the MacRecorder, Sound Designer, Turbosynth, Alchemy, and Sound Exciter.

COMPOSING WITH MIDI. Rick Shaw. Learn how to compose a soundtrack for a video with a 32-track MIDI system using Opcode's Vision.

UNTANGLING MIDI—THE "VIDEO" PART ONE. User-friendly introduction to MIDI, illustrations, troubleshooting tips, glossary, diagrams all using live musical demos and interactive examples.

MIDI CONSULTANTS/LESSONS.

A variety of user-services/lessons/consulting sessions are available to customers who buy from reputable electronic music dealers. Most music stores offer courses or private lessons/tutoring for synthesizers and keyboards.

Private lessons and consulting ranges from $12 to $50 per half hour or full hour. MIDI lessons are commonly offered by music students enrolled at local music colleges; contact through music schools and music stores.

MIDI-TECH. Toll-Free MIDI consulting and training. User and purchasing consulting for any MIDI work station. Call MIDI-TECH: 800-243-MIDI or 312-816-8154.

MIDWEST MIDI CONSULTANTS. Expert MIDI consultants and product suggestions: Call 405-736-6676 for details.

SOUND MANAGEMENT, *ELECTRONIC MUSIC PRODUCTS.* Mail Order knowledgeable, combative pricing. P.O. Box 3053, Peabody, MA 01961. Call 800-548-4907.

SOUNDWARE CORP. MIDI support and product suggestions. 200 Menlo Oaks Drive, Menlo Park, CA 94025. Call 415-328-5773 for details.

TEKCOM CORPORATION. Mac based MIDI systems for all levels of users. 1020 N. Delaware Avenue, Philadelphia, PA 19125. Call for product suggestions and support: 215-426-6700.

PERIODICALS FOR COMPUTERS, RECORDING, & MIDI.

A+/INCIDER. An Apple II/Macintosh user magazine. IDG Communications, Peterborough, 80 Elm Street, Peterborough, NH 03458. Call 603-924-9471; available at newsstands.

ELECTRONIC MUSICIAN. A leading publication for users and professionals that offers special coverage and reporting of new developments in the MIDI world. 6400 Hollis Street #12, Emeryville, CA 94608. Call 415-653-3307; available at newsstands.

MIDI GUITARIST. Unravel the mysteries, discover new territory, reviews, patches, interviews tweaks. Warren Sirota, Editor, published quarterly. MG Subscriptions, P.O. Box 75, Jacksonville, OR 97530. Call 503-899-1948.

HOME AND STUDIO RECORDING. Resource periodical for recording. Music Maker Publications, 7361 Topanga Canyon Blvd. Canoga Park, CA 91393; available at newsstands.

KEYBOARD MAGAZINE. A popular publication for new styles of keyboards, equipment, and other related MIDI products. GPI Publications, 20085 Stevens Creek, Cupertino, CA 95014; available at newsstands.

MACUSER. A leading magazine featuring Macintosh information and products line ups. MacUser, P.O. Box 56986, Boulder, CO 80321-6986. Call 303-447-9330.

MACWORLD. The Macintosh magazine. Comprehensive magazine featuring all Macintosh products. MacWorld, P.O. Box 54529 Boulder, CO 80322-4529. Call 800-525-0643.

MIX BOOKSHELF. Electronic musicians book/video resource. 6400 Hollis St. #12 Emeryville, CA 94608; tel. (800) 233-9604 or (415) 653-3307.

MIX. Leading resource for electronic musicians. Mix Publications, 2608 Ninth Street, Berkeley, CA 94710.

MUSIC, COMPUTERS AND SOFTWARE. Great resource for electronic musicians. MCS Publications, 190 East Main Street, Huntington, NY 11743; available at newsstands.

MUSICIAN. Excellent resource for musicians. Amordian Press, Box 701, 31 Commercial Street, Gloucester, MA 01930.

MUSIC TECHNOLOGY. A MIDI user source. Music Maker Publications, 2608 Ninth Street, Berkeley, CA 94710.

MUSIC PRODUCERS. Top producers reveal exclusive details about their sounds and classic sessions. MixBooks, 6400 Hollis Street, Suite #12-S, Emeryville, CA 94608. Call 800-233-9604.

PC MAGAZINE. Leading magazine for IBM and compatible computers. Available at newsstands.

RECORDING ENGINEER AND PRODUCER. A technical publication. Intertec Publishing, 9221 Quivera Road, P.O. Box 12901, Overland Park, KS 66202.

ROLAND USER GROUP MAGAZINE. Resource for users of Roland products. Roland Corp. US, 7200 Dominion Circle, Los Angeles, CA 90040.

START. Leading magazine for Atari ST and MIDI users. P.O. Box 1569, Martinez, CA 94553-9873. available at newsstands. Call 800-234-7001.

Other electronic music periodicals or quarterly publications are always available at newsstands orthrough dealers, manufacturers, and music stores.

MIDI ASSOCIATIONS/USER GROUPS AND TELECOMMUNICATIONS

ASSOCIATION FOR TECHNOLOGY IN MUSIC INSTRUCTION. To help with instruction in MIDI and music applications. 121 Harrison Avenue South, Hopkins, MN 55343. Call 612-933-5290 for information.

COMPUTER MUSICIANS COOPERATIVE. International cooperative, buying resource. Membership $75. 3010 N. Sterling Avenue, Peoria, IL 61604. Call 309-685-4843 for complete details.

THE INTERNATIONAL MIDI ASSOCIATION. (I.M.A.) The I.M.A. is an international MIDI information network, offers a monthly newsletter, a MIDI hotline, and other important services and support. I.M.A. Individual membership is $40 per year: IMA, 5316 W. 57th Street, Los Angeles, CA 90056. Call 310-649-6434.

MARTUNES. Canadian user group for the Roland Sound Canvas, Proteus, U-220/U-20, D-110 Tutorial available. 2586-B Waterloo Street, Vancouver, BC V6R 3H5. Call 604-736-2434.

THE PARKER ADAMS GROUP. Support for Roland U-220 and other modules as well as multimedia songs. 12335 Santa Monica Blvd. #124, Los Angeles, CA 90025. Call 310-450-2175.

MIDI AND TELECOMMUNICATIONS: 300/1200/2400/9600 BAUD WITH ELECTRONIC MUSIC/MIDI FORUMS.

Nationally there are many bulletin board services offering free-registration for MIDI user groups and services. Your modem, telecommunications software, and personal computer can open a whole new door for learning about MID and supply user support by power users of MIDI systems. Recently, a spread of computer virus within popular networks has become a major factor and concern. If you download a file you may be taking a chance. To be safe install some form of virus protection software on your hard drive.

BBS telephone numbers and services are subject to change without notice.

AMERICAN MIDI USER GROUP/AMUG. Dallas, TX, Telephone: 214-250-2811.

BERKLEE COLLEGE MIDI. Boston, MA, Telephone: 617-739-2366.

AV-SYNC. Atlanta, GA, Telephone: 404-320-6202.

CHOISE STOP. Virginia, Telephone: 703-620-6836.

COMPUSPEC. Electronic modem information system for learning and purchasing the leading MIDI/musical products. CompuSpec, Inc., 9765 Jefferson Plaza, Suite 3, Omaha, NE 68127. Call: 800-999-SPEC, (300/1200 BAUD). Voice: 402-592-0660.

CRAM-SOFT FIDO. Florida, Telephone: 305-226-3310.

DYNASOFT FIDO. California, Telephone: 916-753-8788.

EAST COAST MIDI BULLETIN BOARD SYSTEM. A resource created by and for music professionals. On-line technical/engineering MIDI support for Apple/MAC, IBM/Compatibles, Atari ST, and Commodore. Telephone: 516-928-4986

ENIAC MIDI BBS. Rockville, MD, Telephone: 301-460-9134.

FAMILY COMPUTER CENTER. Virginia, (No 2400 baud rate) Telephone: 703-644-8445.

MIDIMAZE BBS. Chattanooga, Telephone: 615-877-5528.

MIDIQUEST BBS. Dallas, TX, Telephone: 214-881-7311.

MIDIUM. Hollywood, CA, Telephone: 818-764-4538.

MIDWEST ADLIB USERS GROUP. Ohio, Adlib and SoundBlaster Information, Telephone: 513-746-5863.

MIDWEST MIDI. Oklahoma City, OK, Telephone: 405-733-3102.

MIDIWORLD. Los Angeles, CA, Telephone: 213-841-0347.
MUSICIANS' DEN. Colorado, Telephone: 303-321-6857.

NEBULA 2. California, Telephone: 916-351-6193.
PROMIDI BBS. Texas, (No 2400 baud rate) Telephone: 214-248-8530.

RIVER CITY OPUS. California, Telephone: 916-362-6522.

SAN FRANCISCO MIDI USERS GROUP. San Francisco, CA, Telephone: 415-771-1788.

SNARF'S MUSIC STUDIO. Chicago, IL, Telephone: 708-351-0288.

SOUND MANAGEMENT BBS. (Not affiliated with Sound Management, Electronic Music Products) Illinois, 708- 949 MIDI,708-949 KEYS, 708-949-6434.

TASTE BBS. Brooklyn, NY, Telephone: 718-252-4529.

VIDEO PRO. Virginia, MediaNet, Telephone: 703-455-1873.

WALKSOFT I AND II. Michigan, Telephones: 313-435/9905/7818.

WASHINGTON MIDI USERS GROUP. Washington, D.C., MusicNet, Telephone: 703-532-7860.

YAMAHA SGD BBS. Los Angeles, CA, Telephone: 714-522—9464.

Foreign Countries BBS MIDI Networks.
MIDICOM. Quebec, Canada, (No 2400 baud rate) Telephone: 514-744-7354.

MIDILINE BBS. Ontario, Canada, (No 2400 baud rate) Telephone: 613-966-6823.

MIDI MEDIA. Bordeaux, France, (No 2400 baud rate) Telephone: 11-33-56-79-06-09.

BULLETIN BOARD SERVICES
(Subscription Required)

300/1200/2400 BAUD WITH MIDI FORUMS.
BIX. One Phoenix Mill Lane, Peterborough, NH 03458. Telephone: 603-924-9281.

COMPUSERVE. Arlington Centre Blvd. P.O. Box 20212, Columbus, OH 43220. Telephone: 800-848-8990.

DELPHI. 3 Blackstone Street, Cambridge, MA 02139. Telephone: 800-544-4005/617-491-3393.

GENIE. 401 North Washington Street, Rockville, MD 20850. Telephone: 1-800-638-9636/301-340-4000. Also a BBS groups for the IIGS.

PC PURSUIT. c/o Telenet Communications Corp. 12490 Sunrise Valley Drive, Reston, VA 22096. Telephone: 703-689-6000/800-368-4215. Voice 800-835-3001.

THE SOURCE. 1616 Anderson Road, McLean, VA 22102. Telephone: 800-336-3330/703-743-7500.

BOOK LIST

The following books and references are available from Sound Management, Electronic Music Products, P.O. Box 3053, Peabody, MA 01961, Telephone: 800-548-4907. Sound Management has extensive references available to research out and recommend the best material for your particular needs. Please note: Most technical books, manuals, and reference guides offer comprehensive information that will help you develop your technical knowledge and user skills. MIDI books and resource materials provide technical knowledge and product discussion. Usually, no one resource provides solutions to all questions and glitches. But handy equipment-specific reference manuals, by *Alexander Publishing*, 3537 Old Conejo Road, Suite 101, Newbury Park, CA 91320, telephone: 800-633-1123, offer easier-to-understand reference steps. If you are not mastering your popular MIDI keyboard, sythesizer, module, or other MIDI device and your expectations have been delayed, a reference manual may be just what the doctor ordered! Other electronic musician-based books are also available for your well-roundedness achievement,and success.

ALEXANDER PUBLISHING BOOKS AND MIX BOOKSHELF FEATURES INSTRUMENT-SPECIFIC GUIDES FOR ROLAND, YAMAHA, KAWAI, CASIO, ALESIS, OBERHEIM, E-MU, KORG, KURZWEIL, AND OTHER WELL-KNOWN MANUFACTURERS OF POWERFUL MIDI DEVICES. INQUIRE ABOUT YOUR SPECIFIC EQUIPMENT MANUFACTURER'S NAME AND MODEL IDENTICIATION.

MIDI-IN's, OUT's & THRU's
Jeff Rona. An introductory reference book for beginners, musicians, performers, educators, and computer enthusiasts.

THE MIDI HOME STUDIO
Howard Massey. An easy-to-read book for set up and use of a home MIDI system for recording. Super starter book for the beginner or reference for the advanced.

USING MIDI
Casabona & Frederick. A comprehensive guide and reference toward better utilization of MIDI equipment.

A GUIDE TO COMPUTER MUSIC, *AN ELECTRONIC MUSIC RESOURCSE*, 2ND ED.
Donald P. Kozak. A revised edition that is packed with current informaton and references for MIDI products. Comprehensive guide for computer music-based resources and product descriptions for IBM, Laptops, Amiga, Atari ST, Macintosh, Apple II's, GS, Commodore 64/128 computers for development and puchasing. The guide includes complete references for software and hardware, keyboards as well as new MIDI configuraton-diagrams, purchasing tips, user glossary, set-up recommendations, educational curriculum software, and much more.

A GUIDE TO COMPUTER MUSIC
An Introductory Resource for Apple Computers. By Peter Donaldson. This introductory resource is for Apple II, GS, and Macintosh computers. One of the few books written just for the computers. One of the few books written just for the Apple line. Excellent MIDI references for a beginner—how to link your Apple with the fascinating world of MIDI—what, where to buy as well as complete diagrams and a glossary. A Guide To Computer Music includes details and illustrations for computer-based MIDI workstations as well as popular MIDI set-ups with the leading products; buying tips,keyoards / product descriptions, product/dealer contacts, a complete glossary, telecommunications contacts, and music educaton and curriculum goals for computer-based MIDI systems.

MUSIC AND THE MACINTOSH
Geary Yelton. This 180-page book is a must for any Apple Macintosh owner who wants to learn about music products for your Mac. A complete reader-friendly guided tour for making music

with a desktop Macintosh computer—the musician's choice. Music and the Macintosh is a practical introduction to computer music for every musician or hobbyist. You will learn and discover how to digitize musical sounds and turn them into complete songs; compose and print music with score notations software; sharpen your musical skills with music educations programs and how to harness the power of MIDI. In addition, the book takes a close up look at the fascinating world of synthesizers, samplers, and synchronization!

THE ELECTRONIC MUSICIAN'S DICTIONARY

Craig Anderson. Why wonder what an electronic music word means. . . look it up fast and easily with this new, compact guide to the terms most often used in discussing music synthesis, electornics, and recording compiled by Craig Anderton, one of the industry's leading electronic musicians. This powerful resource is the only one you will need! The dictionary contains and explains over 1000 such commonly used but misunderstood words about MIDI and electronic gear. This book is for any starter or electronic musician.

MUSIC & TECHNOLOGY

H.P. Newquist. Trying to sort out the confusing technological-tangle of MIDI, 5computers, synthesis, and you? Here's a hip, new beginner's guide to today's equipment that will remarkably get you up and running in the world of keyboard synths, samplers, MIDI sequencing, and home recording. Clear explanations of each element of the home studio. This 198-page, introductory book covers sampling techniques, music software basics, and signal processing. Music & Technology will answer may of the common questions and will clarify much of the confusion encountered when first using MIDI and eletronics for music.

MIDI FOR MUSICIANS

Craig Anderton. These book are referred to as the conerstone of the MIDI Reference Books. They are excellent introductions to MIDI basics for any user. Complete explanations of why and how MIDI works is covered fully. Practical examples of MIDI uses will help you understand its current applications for music making.

THE MIDI MANUAL

David Huber. Learn the technical basics of MIDI, get acquainted with the functions and featuers of current gear and softwre, and find strategies for using MIDI in your own music. Includes clear, up-to-date coverage to topics like optical drives, standard MIDI files and MIDI time code as well as a MIDI software section.

MIDI SEQUENCING FOR MUSICIANS

By the editors of Keyboard magazine. Overview of MIDI fundamentals, learn the basics of MIDI sequencers hardware and software, review leading MIDI software products, Finale, Creator, Q-Sheet as well as complete MIDI systems.

The following recommendations represents best-selling books for your development and electronic musicship as well as other related resources.

MIDI SYSTEMS AND CONTROL
by Francis Rumsey

SYNCHRONIZATION, FROM REEL TO REEL *by Jeff Rona*

THE NEXT MIDI BOOK *by Rychner & Walker*

HOW MIDI WORKS WITH HOME HOME RECORDING *by Walker, Maestas & Alexander*

MUSIC IN SEQUENCE *by Lloyd & Terry*

USING MIDI *by Casabona & Frederick*

THE MIDI RESOURCE BOOK
by DeFuria & Scacciaferro

THE MIDI IMPLEMENTATION BOOK
by DeFuria & Scacciaferro

MANAGING MIDI *by David (Rudy) Trubitt*

TECHNOLOGY IN THE MUSIC CLASSROOM *by Robert A. Carpenter*

COMPUTERS AND MUSICAL STYLE *by David Cope*

WHAT'S MIDI *by Jon F. Eiche*

WHAT'S A SEQUENCER *by Greg R. Starr*

WHAT'S A SAMPLER *by Freff*

WHAT'S A SYNTHESIZER *by Jon F. Eiche*

A GUIDE TO PERFORMER SOFTWARE *by Dan Walker*

FINALE MADE EASY *by Alexaner & Sherick*

C-LAB NOTATOR VOL 1 *by Shackleton & Alexander*

POWER SEQUENCER WITH MASTER TRACKS PRO/PRO 4 *by Craig Anderston*

THE OFFICIAL CUBASE HANDBOOK *by Geoffrey Ryle*

MIDI SEQUENCING IN C *by Jim Conger*

MIDI PROGRAMMING FOR THE MACINTOSH *by DeFuria & Scacciaferro*

COMPUTER COMPOSER'S TOOLBOX *by Phil Winsor*

MIDI and SOUND BOOK FOR THE ATARI ST *by Enders & Klemme*

ELEMENTS OF COMUTER MUSIC *by F. Richard Moore*

CURRENT DIRECTIONS IN COMPUTER MUSIC RESEARCH *by Mathews & Pierce*

THE MUSIC MACHINE *by Curtis Roads*

COMPUTER MUSIC SYNTHESIS, COMPOSITION AND PERFORMANCE *by Dodge & Jerse*

THE SAMPLING BOOK *by DeFuria & Scacciaferro*

SAMPLING BASICS *by DeFuria & Scacciaferro*

SYNTHESIZER BASICS *by Dean Friedman*

E-MU PROTEUS CHEATER'S GUIDE & COOKBOOK *by Alexander & Mierkey*

ENSONIQ EPS-16 PLUS OPERATIONS & SAMPLING BOOK *by Rychner & Maestas*

ELECTRONIC PROJECTS FOR MUSICIANS *By Craig Anderton*

MUSIC PUBLISHING: A Songwriter's Guide *By Randy Poe*

JINGLES, How to Write, Produce & Sell Commercial Music *by Al Stone*

THE AUDIO DICTIONARY *by Glenn D. White*

THE ILLUSTRATED DICTIONARY OF MICROCOMPUTERS by Michael F. Hordeski

COMPUTER MIDI DESKTOP PUBLISHING DICTIONARY *by Albert DeVito*

AN INTRODUCTION TO DIGITAL SIGNAL PROCESSING *by John Karl*

THE ART OF DIGITAL AUDIO *by John Watkinson*

TIME CODE HANDBOOK *by Cipher Digital, Inc.*

THE MUSICAL PC BOOK and The MIDI Reference Poster *Call Sound Management*

MAGAZINE ARTICLES

The following list of magazine articles are extremely important for reference materials and for the delvelopment of your understanding of computer-music systems and related equipment. No one book or magazine artile can answer all questions or inform the reader completely. This list represents is a collection of articles t hat have been researched for you and have been written extremely well for the novoice, the intermediate level user, and for the professional electronic musician. *(A collection of these resources will be very useful to have on hand; make copies at libraries or purchase back issues of magazines directly from the magazine publishers. (See Chapter 7)*

• Computing the Score: Turn you notation software into a music-publishing powerhouse, By Steve Peha, August, 1992, Electronic Musician.

• MIDI Sequencers: Greatest Hits, By Christopher Yavelow, September, 1989, MacWorld,

• Music Boxes, By Bob O'Donnell, March, 1992, Electronic Musician.

• EM Guide To Keyboard Synthesizers, By Bob O'Donnell, November, 1990, Electronic Musician.

• The Computer Musician: MIDI Interfaces for the IBM PC, By David Trubitt, September, 1990, Electronic Musician.

• Studio, Sweet Studio, By Jeff Rona, Bob O'Donnell, and Gary Hall, September, 1990,EM

• EM's Guide To Music Education Software, Lorenz Rychner, September, 1990, Electronic Musician.

• Working Through the Maze, By Steve Peha, January, 1992, Electronic Musician.

• Music For Beginners, By Steve Cummings, April, 1989, MacWorld.

• MIDI For the Masses, August, 1991, EM.

• Good Vibrations: The PC Joins the Band, By Tim Tully, February, 1989, PC/Computing.

• The New Computers: Platforms for the '90's, By Bob O'Donnell, Steve Oppenheimer, and Craig O'Donnell, April, 1990, Electronic Musician.

• Musical Multitasking, By Rick Davies, April, 1990, Electronic Musician.

• Getting Started With MIDI, How To Use Your Mac To Control Musical Instruments, Audio Equipment, and Even the Lights, By Jim Heid, August, 1990, MacWorld.

• Sound The Next Frontier,A Sound Technology Primer By Mary Cron,
February, 1992, Technology & Learning.

• Frame By Frame, Shot a Music Video, By Michael Molenda, June, 1992, Electronic Musician.

• Mixed Company, The EM Guide to Studio Reference Monitors, By George Petersen, June, 1992, Electronic Musician.

• Computer Musician: The Soft Studio, By David Trubitt, June, 1992, Electronic Musician.

• Money For Music, Grants and Other Funding, By Stephen Dick, January, 1992, Electronic Musician.

• Roland Hardware, By Rolond Staff, 1992, Roland Users Group, The Magazine for the Electronic Musician.

• The Musical Computer, By Craig Anderton, April, 1988, Electronic Musician.

• Dream Machines: Exploring High-End Audio Workstations, Mel Lambert, April, 1989, EM

• Introducing Standard MIDI Files, Michael Czieszperger, April, 1989, Electronic Musician.

• Mixing In The MIDI Age, Craig Anderton, July, 1989, Electronic Musician.

• When Worlds Collide, MIDI Sequencing and digital Audio Recording, Miller & Lehrman, December, 1991, Electronic Musician.

• From The Top: Hard Disk Recording, Dan Phillips, December, 1991, Electronic Musician.

• The Computer Musicain: Microsoft DOS 5.0, Constantine Peters, December, 1991, EM.

• QuickTime In Motion, Lon Poole, September, 1991, MacWorld.

• The Computer Musician: Computer Movies, Bob O'Donnell, November, 1991, EM.

• Making Multimedia, Jeff Burger, November, 1991, Electronic Musician.

• The Last Noise Reduction Article, Part 2, Brent Hurtig, November, 1991, Electronic Musician.

• DAT: What You Need To Know Part I, April, 1989, Daniel Kumin, Electronic Musician.

• Unveiling The Mystery: The Basics of Electronic Music, January, 1991, Dan Phillips. EM

• From The Top: What is MIDI Anyway? January, 1991, Bob O'Donnell.

• Sync or Swim: Synchronizing To Tape, January, 1991, Jeff Burger and Gary Hall. E.M.

• Opening The Voice Box For IBM, By R. Andrew Rathbone, June, 1992, Compuserve Magazine.

• Digital Audio At Last, By Christopher Yavelow, February, 1992, MacWorld.

• MIDI Enters The Classroom, By Edward Tywoniak, April, 1992, Electronic Musician.

• Computer Musician: The Software Design Process, By David Trubitt, April, 1992, EM.

• The MIDI Trap, By Paul Lehrman, February, 1992, Electronic Musician.

• Computer Musician: Standard MIDI Files, By David Trubitt, February, 1992, EM

• Make Your Drum Machine Swing, By Michael McFall, May, 1992, Electronic Musician.

• Working Musician: Solo MIDI Performance, By Frank Macchia, May, 1992, Electronic Musician.

• From The Top: MIDI Processing, By Scott Wilkinson, May, 1992, Electronic Musician.

• From The Top: Sequencing Made Easy, Part 1—Basic Concepts and System Setup, By Scott Wilkinson, March, 1992, Electronic Musician.

• From The Top: Sequencing Made Easy, Part 2—Step-By-Step Procedures To Get You Sequencing, By Scott Wilkinson, April, 1992,EM.

• The Virtuoso Sequencist, By Dan Philips, March, 1992, Electronic Musician.

• Computer Musician: The Opcode Mac MIDI System, By David Trubitt, March, 1992, Electronic Musician.

• MIDI On High, By Brian Gould, July, 1992, Electronic Musician.

• Beating The System, By Chris Meyer with Steve Oppenheimer, July, 1992, Electronic Musician.

• Computer Musician: Computer Music Workstations, By David Turbitt, July, 1992, EM.

• Digital Piano Buyer's Guide, Fall, 1992, Electronic Musician. The Digital Piano Buyer's Guide is the only guide written for the primary buyers of digital pianos and portable keyboards—families, music educators, church musicians, and upscale recreational musicians—with easy-to-understand information for those unfamiliar with technical musical instruments.

Chapter Eight: Multimedia Tools, Products, and CD-ROM

MULTIMEDIA TOOLS, PRODUCTS & CD-ROM

Multimedia is in! In it simplest form multimedia involves using a computer to link sound and graphics. A multimedia system may include some or most of the following: a computer, hard disk drive, a CD ROM player, add-on card for digital video, sound and graphic add-on board, supercolor display, multimedia presentation software, MIDI/audio recording software, QuickTime multimedia kit, stereo speaker system, VCR player, overhead projector, a scanner, MIDI equipment—interface—software—keyboard/module.

Music, sound, and visual display are among the most vital elements of an effective multimedia presentation—music evokes emotion. Your MIDI music and equipment has the flexibility to be integrated. Using MIDI to produce music for multimedia is far more efficient and a great deal more affordable than DSP-based digital audio systems. MIDI can play music on any Macintosh in limited memory mode, without effecting the performance speed of you animation and graphics presentation. Integrate MIDI music to your presentations using Macromind Directory or other HyperCard presentation software as well as Apple's MIDI Manager.

Today, when you purchase a new Macintosh si, LC, PowerBook, or higher, the machine will come with a built-in microphone and system software for recording any kind of sound to save on disk. If an older Macintosh doesn't have this built-in ability, you would need to add a Mac Recorder system or other hardware for obtaining similar sound effects. It may also be time to update you computer hardware and display. A fast computer's operating system, accelerator add-on board, for real speed, larger hard drive and color display monitor and computer hardware that has expansion slots /ports for multimedia add-ons are most important.

Multimedia tools and products allow enthusiasts the opportunity to link pictures, digital sounds, graphics, and information into a form of organization for a performance or show-and-tell presentation. In addition, multimedia systems have recently grown to include QuickTime. QuickTime is a term used that allows the user to add motion to a pre-defined set of graphics and sound files—just like making a movie. The following is a listing of multimedia, Macintosh and IBM CD-ROM products. Most computer platforms, including the Atari and Amiga have software, hardware and CD-ROM titles available. Amiga computers have extensive products for multimeda applications.

NEC CD ROM Gallery. The faster the CD ROM player the better and NEC offers several CD players. No one wants to be using sophisticated equipment and then have to wait for the CD ROM player to finally update the screen! If possible, purchase the advanced model of the CD ROM player; you will be happy you did. The NEC CD ROM Gallery package would add new capabilities—display pictures and illustrations and listen to live audio and see motion on the computer screen. CD ROM capabilities becomes a new channel for obtaining and presenting information; i.e., a school using a CD ROM system with a CD US History Disk for review or advanced project or a preschooler using classic CD ROM children's stories (Cinderella) for introduction to reading and computer skills or a music education program using a CD ROM disk (Beethoven's 9th) for presenting music awareness and appreciation or music history for the last 500 years. The NEC CD ROM Gallery usually includes: the CD ROM player, 2 amplified stereo speakers, some batteries (if necessary) cables and wires for connections, and 7-10 CD ROM titles. Even if you do not plung into the full multimedia route, a complete CD ROM system is a fantastic enhancement to any computer system. *All multimedia products below are available through Sound Management 800-548-4907.*

• **VideoSpigot NuBus**. The VideoSpigot NuBus digital-video hardware add-on system is for making QuickTime movies with all Nu Bus equipment.

This system will capture and digitize NTSC/PAL Video camera input at a rate up to 30 frames/second with incredible 24-bit color. This complete system is for a Macintosh IIsi or LC or Pro system for a higher Macintosh. You will be able to fully digitize data so you can store it on an ordinary hard disk or optical cartridge. This system will integrate all the multimedia functions for recording, trimming, previewing, storing, and playing QuickTime video.

• **Spectrum/8, 24 PDQ Color Graphics Card.** This card is the one of the most cost-effective, single-slot solutions for accelerating 8-bit graphics on large-screen displays or 24-bit for small screen displays.

• **SuperMatch 17" Multimode Color Monito.** This 17" color display includes multiple modes, with support for 1024 x 768 full-page plus, 832 x 624 WYSIWYG, and 640 x 480 magnified view resolutions.

• **VideoSpigot + Sound.** VideoSpigot & Sound give you everything you need to develop multimedia presentations on a NuBus Macintosh without audio capabilities. This system includes everything you will need to produce multimedia presentations.

• **ScanMaker 600ZS.** A versatile scanner to capture 24-bit color, 8-bit gray-scale and black-and-white images at resolutions up to 600 dots per inch. Outstanding image quality, features a sleek flatbed design and comes with a built-in Apple SCSI interface and Adobe's Photoshop, Savitar's Scan Match color calibration software and other related accessories.

• **AudioTrax.** AudioTrax combines a 2-track digital audio recorder (for adding real voice) with a 64-track MIDI sequencer. audio into a MIDI soundtrack for multimedia-desktop presentations. AudioTrax would need MacRecorder Digitizer or a new Mac with a microphone and system software. AudioTrax will record and playback digital audio in sync with your musical soundtracks as well as add dialog, voice overs, sound effects and music to multimedia presentations.

• **Alchemy.** This powerful program is professional multimedia 16-bit audio editing software. Alchemy provides a fast and elegant way to retrieve, edit and store sampled sounds. With alchemy you can create any sound imaginable! With its powerful harmonic spectrum editor and resynthesis capabilities, Alchemy gives the user sound designing capabilities. You will be able to playback direct for disk, amplitude and frequency edit, time scale and pitch shift, harmonic analysis and resynthesis, distribute audio networking, digital signal process, provide true stereo editing and create automated fades and crossfades.

• **Apple's QuickTime Starter Kit.** The QuickTime Starter Kit opens the door to multimedia. The user will be able to include video, animation, high quality still images, and sound in Macintosh applications.

• **Professional QuickTime Authoring Kit.** Macromedia's Professional QuickTime Authoring Kit will be everything you need to start making QuickTime movies. With Director 3.1 you can create, combine and synchronize sophisticated graphics, text and animations with audio and video for attention-grabbing digital effects. You can also add full interactivity with buttons. MacRecorder Sound System Pro allows you to sample, record, and edit sound to spice up any multimedia production. ClipMedia Volume #1 give you an incredible collection of sound effects, animations, digital video sequences to cut, copy, paste into your own movie.

• **DiVA Video Shop.** Another multimedia production product. The user will create and edit attention-grabbing QuickTime movies. DiVA Video Shop will let you record video to your hard drive in real time, arrange multiple video windows, apply filters and transition effects and capture screen shots. It is easy to use for presentations that need to combine video, text, graphics, sound and animation and still use the familiar Macintosh cut, copy, paste, commands.

• **Beethoven's String Quartet CD-ROM.** Classical music at its best. Set up your Mac Plus or higher, a hard drive, HyperCard, a CD-ROM Drive,

speakers or headphone and you are ready to enjoy Warner New Media's second Audio Notes CD-ROM—Beethoven's String Quartet No. 14, Op. 131. Warner New Media, 3500 W. Olive Ave., Ste. 1050, Burbank, CA 91505. Call: 818-955-9999.

• **Dr. T's Composer Quest CD-ROM.** This new CD-ROM is an exploration of music, history, arts and sociological change from the year 1600. The user will investigate the greatest composers of classical and early jazz music. Features over 60 great musical performances, valuable biographies of important composers, on-line help, near photo-quality 256-color VGA graphics, screens, music trivia questions and a quiz.

• **Unidisc, Inc. CD-ROM DIRECTORY.**
(Available for current year).
This CD-ROM is one of the most complete resources available for containing current facts on over 1500 CD-ROM products including descriptions, prices, and subjects, with information on over 1800 companies in the CD-ROM industry world wide.

• **Autodesk Multimedia Explorer IBM-PC CD-ROM.** Dive into the new world of multimedia with your IBM/compatible. Multimedia Explorer includes three comprehensive tools to get you started. This package, software driven 3.5 and 5.25 disk includes a CD-ROM disk containing clip art. Autodesk Animator software choreographs brilliant color graphics and text to produce computer animations. Autodesk Animation Player allows you to sequence animations with sound, plus the Animator Clips on the CD-ROM give you a vast library of still images and animation clip art..

• **Brown-Wagh Publishing Curtain Call.** This IBM CD-ROM title will produce professional-quality Windows 3 presentations with exciting graphics, digital sound and MIDI music. Work with full-featured paint tools, or import graphics and clip art from other sources. Create beautiful backgrounds, transform fonts with shadows, outlines, strobes, 3-D extensions. This package is also compatible with Sound Blaster.

• **Brown-Wagh Publishing PC Animate Plus.** This high-resolution IBM program helps you create colorful animations for action-packed presentations, education, and fun. It includes paint/drawing tools, special effects, transitions, and powerful frame controls. Digitized speech, music, or sound effects can be synchronized with the animations using Sound Blaster audio card. Compatible with Autodesk Animator.

• **Gold Disk, Inc. Animation Works.** Animation Works is a 1 to 8-bit, easy-to-use, path-based animation IBM program. Enables users to easily create and combine graphics, text, and animations and synchronize them with sound and video. Animated objects (cels) are created in the Cel Editor and then animated over static or scrolling backgrounds in the movie editor. Tools are provided for creating paths. There is also a variety of wipes, the ability to add sounds, color cycling, multiple palettes and a looping control.

• **Walt Disney Computer Software, The Animation Studio.** The Animation Studio is the only full-featured IBM and Amiga animation and paint program to utilize state-of-the-art cel animation techniques that are characteristics of Disney-style animation. Whether a professional or novice, this program gives you the ability to create or enhance full-length animated sequences. The exclusive onion skin technology allows you to see-through the cel you're on and three cels behind it. This amazing program also allows you to order your cels, control the timing of each, superimpose and add color, sound, and music to your animation.

• **Voyager Company-The CD Audio Stack.** This Mac CD helps you create your own interactive work, using any audio CD or CD-ROM. 25 ready-made buttons control familiar CD functions. The Event Maker lets you precisely select a sequence (to 1/75 of a second), and then creates a button that plays that event. An extensive list of ideas and suggestions-including sample scripts, cut-and-paste buttons, and running examples-gives you how-to tips and solutions to common problems.

• **Voyager Company-Franz Schubert: "The Trout" Quintet CD Companion.**
Join music critic Alan Rich for a light-hearted yet information-packed examination of Schubert's well-loved musical masterpiece. Select and instantly hear any part of the quintet. You can even listen to the song on which Shubert based his quintet, in English or in German! Of course, you get all the features you'd expect from a Macintosh CD Companion: informative commentary, a look at the composer's life and instruction in listening.

• **Voyager Company-Igor Stravinsky: The Rite of Spring CD Companion.**
Controversial at its premiere in 1913, striking in its impact even now, this ballet score is explored by Robert Winter in the second title of the critically-acclaimed CD Companion series. Compact disc contains a spectacular performance by Charles Dutoit conducting the Orchestra Symphonique de Montreal and an eight part Macintosh Hyper Card program that includes much more.

• **Voyager Company-Ludwig van Beethoven: Symphony No.9 CD Companion.**
In this exhilarating and illuminating multimedia program, music historian and UCLA professor Robert Winter examines why Beethoven's Ninth Symphony endures as one of the world's most recognized an beloved classical works. This CD Companion includes an electrifying performance by Hans Schmidt-Isserstedt conducting the Vienna State Opera and the Vienna Philharmonic. Mac.

• **Voyager Company-Mozart: The "Dissonant" Quartet Interactive CD Companion.**
The great composer goes interactive in this exciting exploration of his chamber music masterpiece. Robert Winter, author or our acclaimed Ludwig Van Beethoven: Symphony No. 9 CD-Companion, has used computer programming and video disk technology to create a multi-tiered audiovisual feast of text, still frames, full motion video, and three complete music and narration soundtracks. Mac/CD-ROM.

• **Warner New Media-A German Requiem.** The greatest choral work of the Romantic era, A German Requiem is performed brilliantly with Robert Shaw conducting the Atlanta Symphony Orchestra and Chorus. More than 50 side journeys enhance the musical experience with illustrated biographical, historical and musical insights. Mac/CD-ROM.

• **Warner New Media-The Magic Flute.** Mozart's fanciful work is enhanced by more than one hour of commentary, additional music and more than 7000 screens of information. Unravel the plot, with its paradoxes and Egyptian and Masonic layers, and experience translations and music analysis. The performance is conducted by Nikolaus Harnoncourt. Includes HyperCard. Mac/CD-ROM.

• **Warner New Media-The Orchestra.** Benjamin Britten conducts the London Symphony Orchestra in a performance of his own composition, "The Young Person's Guide to the Orchestra". This Audio Notes program invites you to see what instruments look like and hear how they're played. Graphics highlight who's playing when, while a full-length illustrated analysis explains how Britten put the pieces together. Mac/CD-ROM.

• **Warner New Media-The Orchestra.** This String Quartet No. 14 includes thousands of pictures, more than 250 examples of sound and music, analysis, commentaries and historical information, plus a musical workshop, glossary and index. Includes HyperCard. Mac/CD-ROM.

• **EBook, Inc.- Jazz: A Multimedia History.** This program presents an extensive look at the history of jazz by renowned musicologist, Lewis Porter. It includes extensive examples of the music in audio, MIDI and standard notation from Jazz: A Multimedia History is a ground breaking event in jazz education and appreciation. Mac/CD-ROM,

• **CMC Research-Shakespeare.** Contains the complete, unabridged works of William Shakespeare, the greatest English playwright of all time. This disk contains all of his plays, poems, and sonnets in both the American English and Queen's English versions. PC and Mac CD-ROM format..

• **Best of MIDI Connection.** Mac/CD-ROM, Sound Management, 800-548-4907.

List of Computer & Electronic Music Terms

LIST OF COMPUTER & ELECTRONIC MUSIC TERMS

The expanding presence of computers and musical electronics has increased the need for understanding basic terms within these fields. The following list of *Computer & Electronic Music Terms* is included to help electronic literacy.

ABSTRACT SYNTHESIS: The manipulation of waveforms in such a manner as to create new sounds not commonly heard in nature.

ADDRESS BUS: A communication line inside computer hardware along which the memory locations of data are sent.

AI: An acronym for artificial intelligence; the use of fifth generation programming applied thinking and reasoning for higher-level tasks, e.g., voice synthesis, auto-correction in music composition and sequencing.

AMPLITUDE: The magnitude of a voltage or waveform; volume.

ANALOG: Pertaining to data in which numerical information is represented by electrical signal in continuous form; opposite of digital data.

ASCII: An abbreviation for American Standard Code for Information Interchange. Text files can be stored as ASCII format so that other computer operating systems may be able to read them.

AUDIO CABLE: The shielded connected used when connecting one audio device to another.

AUDIO PATCH BAY: A connector box used to patch all audio wires into one place.

AUDIO SIGNAL: Any voltage sending sound information. Most signals are used in recording and processing.

AUTO-CORRECT/AUTOMATIC CHECK: A function of a sequencer or drum machine that will automatically correct/adjust the timing or rhythm of the composition; for rhythmic timing. Also know as "Quantizing."

BACKUP COPY: To make a second or an additional copy of data files for assurance.

BAUD/RATE: Used to determine the rate of speed at which communication data can be sent between devices.

BIT: A binary digit.

BUG: A hardware or software problem that causes processing failure.

BYTE: A group of eight bits. It takes one byte to store each letter of information.

CAI: An abbreviation for computer-assisted instruction; educational software programming technique use for learning and training.

CHANNEL: In reference to one MIDI data path; the transmission of MIDI data/messages on any one of 16 routes. Each channel can be addressed to send and receive MIDI information. Each channel can carry a different signal.

CHIP: A very thin slice of silicon treated to store thousands of electrical circuits to form an integrated circuit.

CLOCK: The standard way to set a timing signal for the tempo of a music composition and playback recording. A sequencer (hardware or software) has a clock for the purpose of synchronizing tracks and MIDI data.

CONDUCTOR TRACK: A specific track that stores tempo information. A conductor track, may have a **TEMPO MAP** that will describes all the tempo changes in the music.

CONTROL BUS: A communication line along which control data flows.

CONTROLLER: A MIDI device with a dedicated function; controllers make no sound but convert and produce MIDI data sent to another MIDI devices that is mono or polyphonic; MIDI guitar controller, drum controller, keyboard controller, bass controller, wind instrument controller, MIDI motion sensor controller.

CMS: An abbreviation for computer music system; an organization of computer hardware, software, MIDI devices, and audio equipment used to generate digital sounds for music; also referred to as a computer-controlled music system or MIDI system.

DAT: Digital Audio Tape, the new generation of stereo tape recording that store audio on a digital tape.

DATA BUS: A communication line that transports program data.

DAISY CHAIN: A term used to described the serial connection of several MIDI devices to one another; the MIDI THRU port is used for this connection.

DECIBEL: The unit of measurement used for audio levels (dB).

DELAY: A term which describes the interval of time required for the vibrato effect to be heard once the beginning of a note is played

DEMO: A DAT or cassette tape that contains a recording of an original or specific sound/ song or work that represents most of the characteristics of a musician wishing to be heard.

DIGITAL: Pertaining to data in the form of digits: 0's and 1's (on or off); opposite of analog.

DIGITIZE: To express/save/reuse data in a digital format. The process of recording sound in a digital format. A digital recording system will samples the sounds at a certain frequency and then stores it as a digital value.

DISK: Floppy or hard storage media; rotating material used to store bits of information.

DISPLAY: The visual picture seen on the monitor in color or black and white.

DISTORTION: The change in tone characteristics, usually not desired.

DOC: Digital Oscillator Chip; a 15 voice microelectronic chip found in every Apple IIGS.

DOUBLE-DENSITY/DOUBLE SIDED FLOPPY DISK: A disk that can store twice the amount of information and uses both sides for storage.

DRUM MACHINE: MIDI percussion (electronic percussion) device manufactured by the leading producers of MIDI equipment. A drum box is programmable and will produce quality drum sounds and rhythm patterns for use in a CMS.

DRUM SYNC and TAPE SYNC: The way to synchronize (start at the same time) MIDI drum data to a tape recorder.

EDIT: The process by which data is corrected: insert, delete, paste transpose, etc.

EVENT LIST: When using sequencing software and editing tracks, the track's content is displayed as a table of MIDI data.

ELECTRONIC MUSICSHIP: The skill, ability, and artistry used to produce electronic generated music.

ELECTRONIC WIND INSTRUMENT: A MIDI wind instrument or controller that produces MIDI data..

ELEMENTS OF SOUND: Three distinct characteristics of every sound: pitch, timbre, and amplitude.

EQUALIZER: An audio device with levers and slide bars used to regulate and alter sound frequencies: the highs, lows, and midrange.

FEEDBACK: A high frequency noise when audio devices (microphone and speakers) are placed too close to one another.

FORMATTING: (Initializing) The process of preparing a disk to accept/receive information; includes laying down of data tracks on a disk.

FREQUENCY: The vibration rate of sound; expressed in KHz or Hz.

FREQUENCY RESPONSE: A range of responses of frequencies that audio gear may be able to duplicate.

GLITCH: A disturbance of electrical data that causes some variation of normal operation.

GM (GENERAL MIDI): A new standard among manufacturers of MIDI instruments; it basically standardizes program, drum note, and continuous controller assignments for synthesizers and modules. Only works with GS divices, i.e., Roland's Sound Canvas, SC-155, Roland's JV-30 and JV-80, Korg's 03R/W and Yamaha's TG100 sound module.

GRAPHIC EDITING: When using sequencing software, a track's contents is displayed on a grid as horizontal bars.

HARDWARE: A term used to describe a large variety of electronic components: the computer, add-on cards, printer, monitor, disk drives, MIDI equipment, audio equipment; all external peripherals.

HERTZ: A unit of frequency equal to one cycle per second.

HISS: An electrical generated disturbance/light noise causing audio and recording difficulties or background noise. Usually caused by a weak signal or faulty connections.

HUM: An electrical generated disturbance/deep noise causing audio and recording difficulties or background noise. Usually caused by weak or loose connection of wires, plugs, cables, adapters, or audio equipment.

HUMANIZE: An option found on sequencing software that performs the opposite function of quantizing-- it adjusts notes off their exact beat values to improve the sound and feeling of the music; it helps to avoid techno sounds.

INPUT JACK: An audio input that connects output into an input jack.

INTERFACE: A method to share a boundary; to connect and then process.

IMITATIVE SYNTHESIS: To duplicate the sounds of traditional musical instruments and sounds.

JOYSTICK: An external input device that uses a movable lever with one or two buttons to press that activates the software.

LCD: A digital display screen consisting of a liquid crystal material between sheets of thin glass that become readable in the presence of an applied voltage. Usually found on a calculator, synthesizer, sequencer hardware, and drum machine.

LOW-PASS FILTER: To filter/remove unwanted high frequencies.

MASTERING DECK: Used in multitrack studios for obtaining the final cut.

MENU: A pull-down or pull-up list of commands which appears on the monitor and allows for selection of specific operation.

MICROPHONE: A hand-held or stand-help device for acoustics used to transfer sound.

MIDI: An acronym for Musical Instrument Digital Interface; a serial protocol that allows MIDI-equipped instruments and devices to communicate and to be compatible.

MIDI BOTTLE NECK: Also known as a MIDI recording choke; too much MIDI data being processed via sequencer or synth.

MIDI CABLES: A special 5- pin DIN cable used to connect MIDI devices. MIDI cables are available in a variety of lengths up to 50 feet.

MIDI CHANNEL: Similar to "CHANNEL," the path/route for MIDI data to travel; assignable MIDI channels are 1-16.

MIDI DELAY: Technical MIDI data transmission delay. Usually corrected by filtering device.

MIDI FILTER: MIDI device that can remove unwanted MIDI messages; e.g. aftertouch data.

MIDI IN: The standard port (5-DIN receptacle) used for connecting a MIDI devices to receive MIDI data; located on the rear panel of a MIDI-equipped instrument/device.

MIDI INTERFACE: The industry standard and a necessary component used to connect a computer to MIDI devices. A snap-in, add-on board, or a stand-alone device with MID IN/OUT. A MIDI interface allows a computer to send and receive MIDI information. All Apple II and Macintosh, Commodore, IBM, and compatible computers need a MIDI interface; Atari ST series have built-in MIDI interface ports ready for connection. (Standard MIDI interface hardware is available from: Altech, Apple, Passport, Opcode, Sonus).

MIDI MIXER: A MIDI device that combines two or more MIDI devices' output.

MIDI OUT: The standard port (5-DIN receptacle) used for connecting a MIDI devices to transmit MIDI data; located on the rear panel of a MIDI-equipped device.

MIDI SYNC DEVICE: A MIDI device that translates MIDI data to SMPTE data.

MIDI THRU: In addition to MIDI IN and MIDI OUT, a MIDI THRU port is a third MIDI receptacle/connector available only on some MIDI devices; it is used to connect MIDI equipment and devices in a series or daisy chain.

MIDI THRU BOX: MIDI connection hardware; junction box that allows a variety of MIDI devices to be connected; Yamaha MIDI Thru Boxes or JL Cooper Boxes-MSB16/20.

MIDI PATCHER: A device used for connecting and integrating; usually contains eight in and out MIDI routings and memory ability for patch sounds and switches.

MIDI SWITCH: An on or off switcher that can regulate MIDI data messages.

MIXDOWN: The steps used for joining the tracks.

MIXING CONSOLE: An electronic device used to blend and direct audio while maintaining its perspective.

MODEM: An external hardware device or an internal add-on card used to connect a computer to a telephone line for communication with another computer and data bases.

MODULE: MIDI synthesizer or sampler with no keyboard; fits on a rack or shelf and generates, sends, and receives MIDI data; MIDI modules are used with synths and controllers and cost less money.

MODULAR PROGRAMMING: A method of sequencing MIDI data in sections; which then can be re-connected to the entire composition.

MONITOR: A television-type screen or CRT device used to receive computer output. The more pixels a monitor has the sharper the images appear. Also, to listen to, through speakers or headphones.

MONOPHONIC: The way to describe a musical instrument that has only one sound.

MOUSE: A small hand-held external input device used for pointing and clicking to execute computer commands. A cursor/pointer/icon appears on the screen and by moving, pointing, and pressing a button on the mouse the software performs a task.

MULTITIMBRAL: The ability of some MIDI instruments to produce two or more different sounds or timbres. Multitimbral devices have 4 to 16 independent voices that can produce bass, string, percussion, and horn sounds simultaneously.

MULTI-TRACK: The technique used to record different musical parts separately which then are synchronized for playback.

MUSIC PRINTING: A print out of a composition in standard music notation; an important feature when selecting music composition software.

NOTATION SOFTWARE: Software that converts musical data into sheet music.

NOISE: Similar to a hiss or a hum within a recording environment or music workstation that is unwanted.

OMNI MODE: A term used when a MIDI device is receiving on multiple MIDI channels, more than one MIDI channel.

OSCILLATOR: Pulse-generating microelectronic circuitry in which the frequency that the pulse is generated will determine the tone.

OUTBOARD DEVICES: Audio signal processors that will add reverb or other effects to audio signal for more dynamic acoustics.

QUANTIZATION: Auto-correct; a feature of some sequencers and drum machines that adjusts the rhythm to the nearest user-specified setting.

PARAMETERS: A series of control functions used to set and select MIDI instrument sound data.

PANNING: The process of controlling and adjusting recorded instrument sounds; this feature is found in some digitizing software.

PARALLEL: Pertaining to the simultaneity of two or more processes.

PARTS: The pieces the whole composition that may be recorded individually or with other instruments.

PATCH: A specific sound or group of voices/sounds store in a MIDI instrument or on disk, cartridge, or in RAM/ROM.

PATCHING: The way to connect devices to one another.

PEAK: The loudest volume/amplitude.

PITCH: The relative position of a tone on a scale as determined by its frequency.

PIXEL: A tiny rectangular element used to form images on a monitor. The higher the number of pixels; the higher the quality of the screen's resolution.

POLY MODE: A term used when a MIDI device is receiving on one MIDI channel.

POLYPHONIC: The way to describe a multi-voice instrument. Capable of playing more that one note at one time.

PORT: The point of connection for in/out of devices. (i.e., serial port, printer port)

PRE-SETS: A feature of MIDI and nonMIDI instruments which can be factory or user programmed; storage of previously sampled sounds or customized sound patches; for example, drum beats, wind instruments, steel drums or bass.

PROGRAM or SOFTWARE: A set of detailed instructions written in a computer language used to perform a specific task or application; commonly found on 5.25, 3.5, or CD ROM.

PUNCH IN OR OUT: The way to change a specific part of a composition; an important edit feature in sequencing or tape recording.

RAM: Read-write memory; available for use within the computer's memory board. Each software package requires different amounts of RAM.

RECORDING LEVEL: The depth and strength of an audio signal.

REVERB EFFECT UNIT: A device used in a MIDI system that can add a variable echo effect to the musical data output; reverb effects can add character and natural dimensions to the electronic digital sound.

REAL TIME: A term used to describe actual time, live performance, or what is currently occurring. The easiest and most common method of recording a sequence of musical data.

REVERB: A sound effect used in recording and performance.

ROM: Read-only memory used for permanent storage of data.

RUNNING STATUS: A feature of some MIDI devices/keyboards; a way of sending data bytes.

SAMPLED SOUND: A single sound or collection of preprogrammed or prerecorded real sounds. Digitizer hardware or a sampler keyboard can duplicate a sound source's parameters. To sample sound, such factors as sampling rate, volume, balance, frequency, and reverb are regulated. Sample sounds can be edited for instrument-based sound libraries--pianos, strings, lead-ins, splits, brass, basses, special effects, birds, nature sounds; formatted on data cassettes, RAM/ROM cartridges, 3.5 disks and computer specific floppy disks.

SCORE: The formal layout of musical notation for a piece of music.

SEQUENCE: A section or segment of music you enter into memory for editing and modification.

SEQUENCER/EDITOR: Computer software or dedicated hardware; a MIDI data recorder used to edit, compose, and playback musical data entered by step time or real time via a MIDI device.

SERIAL INTERFACE: The type of connection over which one bit of data moves after the other on the same wire.

SIGNAL PATH: The entire cycle completed when using a recording system.

SIGNAL PROCESSOR: A device used in a MIDI system that can alter an audio signal; that is in reverb effects, delay, and compression. Multi-effects/signal processors can manipulate the audio signal in many ways.

SLAVE: In reference to the connection of two or more electronic instruments in which one, the master, controls/plays the other/s.

SLOT: Expandable internal computer hardware openings; the connection in which an add-on hardware card is snapped into. Slots can be identified by number or location on the motherboard.

SMPTE: The official timing standard and code used by the Society of Motion Picture and Television to sync audio to film/video productions.

SONG POSITION POINTER: A MIDI feature/command when synchronizing musical events to occur at the same time; setting the MIDI clock to coordinate the sequences and MIDI devices.

SOUND LIBRARIES: Very similar to voice librarians, in that a collection of patches, tones, or sounds (bank of 32) are prerecorded; sound libraries can be edited by changing the envelope. These libraries allow your computer or MIDI system to emulate a piano, violin, trumpet, and nature sounds.

SOUND PATCH EDITOR: Software sound editor used to alter presets and existing sound files for most leading synthesizers.

SOUND SAMPLING: To record external sounds directly into your computer or MIDI equipment for musical use, editing, and storage.

SOFTWARE: A term used for a computer program; music, word processing, and educational programs are available on 3.5, 5.25 size floppy disks.

SOFTWARE UPGRADES: Manufacturers of computer software announce new software upgrade versions to registered owners (free or for a small charge) with improvements and advanced features; e.g., V1.0 has been upgraded to V1.1, to V2.0 to V3.01, etc.

STEREO: The standard in recording for sound to be heard over two speakers.

STEP TIME: The method used to enter musical data a section at a time.

SURGE SUPPRESSER: A device for protection against A/C voltage spikes and interrupts. Some devices combine system cooling and voltage protection.

SYSTEM-EXCLUSIVE DATA: Two of the 16 MIDI channels are reserved and dedicated to performance data that is distinct to specific equipment.

SYNC/SYNC TONE: An electronic tone used to coordinate MIDI devices by setting and controlling the clock.

SYNC TRACK: A specific track of software sequencer that will process and match the sequenced tracks to a multitrack tape recorder using a sync-supporting MIDI interface.

SYNTHESIS: To produce artificially or to imitate; to duplicated the sounds of musical instruments; forms of synthesis include: additive, subtractive, phase distortion, FM and LA.

SYNTHESIZER: (Synth); MIDI equipment that can generate any sound by waveform. Synthesizers have keyboards or are keyboardless; sophistication, expense, sound quality, and ease of use are common considerations. Well-known manufacturers include: Korg, Roland, Yamaha, Fender, Casio, Ensoniq, E-MU Systems, Kurzweil, Fairlight CMI, Synclavier.

TAPE RECORDER: Recording and play back gear used to store audio on cassette or reel to reel.

TAPE-SYNC: The technique used in tape recording; transferring of musical data from a computer to recorder; usually a MIDI interface with tape-sync features would coordinate with sequencing software.

TIMBRE: The quality of a sound that distinguishes it from other sounds of the same pitch and volume; the distinctive tone of a musical instrument, a voice.

TONE MIX: A feature or mode of some MIDI devices that enables two timbres to be played together.

TOUCH-SENSITIVE: The ability of some MIDI keyboards to respond to the user's touch of the keys; soft or heavier striking of the keys will result in soft or heavy sound responses.

TRACKS: In reference to the storage on the width of a tape; for sequencing software--the way musical data can be stored and routed to a variety of MIDI devices to produce different musical tasks. A drum or bass track is laid down to create a rhythm, and it can be looped, or repeated.

TRANSCRIBER: Music software that will transfer real time data to the computer's memory for storage on disk, editing, or printing.

TRANSDUCER: A microphone or loudspeaker; transfers sound.

USER-FRIENDLY: A term used to describe an easy-to-use interface; e.g., easy-to-use software.

VOICE LIBRARIANS/VOICE PROGRAMS: Software with prerecorded instrument sound files that contain a variety of natural or abstract sounds used with specific MIDI instruments.

VIBRATO: The ability of an electronic device to add expression to a note by regularly varying the pitch.

WAVEFORM: The shape of the frequencies that produce a sound; e.g., triangle, sawtooth, square, pulse, sine, resonance wave.

WINDOW: A term used to describe the portion of a program's menu, seen on the monitor, used to execute a command.

WIND-TO-MIDI: MIDI controller that converts a wind instrument to MIDI data.

WRITE-PROTECTION: A system used to prevent erasure of data; every floppy disk has a write-protection lock system.

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